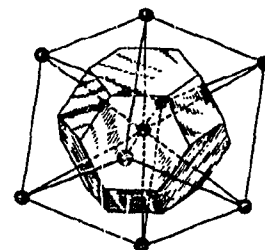


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ORNL/RMIC-14

**DIRECTORY OF  
CRYSTAL GROWTH AND SOLID STATE  
MATERIALS PRODUCTION AND RESEARCH**

**RESEARCH MATERIALS INFORMATION CENTER**



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DIRECTORY OF CRYSTAL GROWTH AND SOLID STATE  
MATERIALS PRODUCTION AND RESEARCH

Compiled by

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Research Materials Information Center  
Solid State Division

MARCH 1979

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## THE RESEARCH MATERIALS INFORMATION CENTER

The Research Materials Information Center, established in 1963 as part of the ORNL Solid State Division, provides information, on an exchange basis, on the properties, preparation, and availability of ultrapure inorganic research materials. In general, coverage is of all solid-state materials science except the manufacture and properties of devices and "engineering" properties of the materials covered. A sampling of the variety of specific subjects or materials covered includes ferroelectricity, superconductivity, dielectrics, semiconductors, metals, ceramics, crystal growth, crystal structure, photovoltaics, fast ionic conductors, methods of measurement, refractive indices, laser windows, specific heat, thermal expansion, impurity assay and effects, characterization methods, and materials for energy applications.

Technical inquiries and requests for further information on the Center should be addressed to:

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This directory lists only those who returned questionnaires distributed by the Research Materials Information Center during 1978. The directory includes, in addition to crystal growers, those preparing starting materials for crystal growth and ultrapure noncrystalline research specimens. It also includes responses from those characterizing, or otherwise studying, the properties of materials provided by others.

The international coverage of the directory is limited to those countries not covered by other recently published directories and is indicated in the table of contents immediately preceding the index of materials. Other countries are included in the following publications:

*Sources of Single Crystals in the United Kingdom and Scandinavia, 1978* (for United Kingdom, Denmark, Norway, and Sweden).  
Available from Mrs. B. M. R. Wanklyn, Clarendon Laboratory,  
Parks Road, Oxford OX1 3PU, United Kingdom.

*Information über Kristallzüchtung, 1976* (for Germany, Holland, and Switzerland).  
Available from Prof. Dr. R. Nitsche, Kristallographisches  
Institut der Universität Freiburg, 7800 Freiburg i. Br,  
Hebelstrasse 25, West Germany and Prof. A. Raüber, Institut  
für Angewandte Festkörperphysik der Fraunhofer-Gesellschaft,  
7800 Freiburg i. Br, Eckerstrasse 4, West Germany.

*Documentation sur les Synthèses Cristallines, 1976* (for Belgium, Spain, France, and Italy).  
Available from Prof. A. M. Vergnoux, 42 rue St. Claire,  
87000 Limoges, France.

Although most of the information in the OTAN/NATO list is also in this directory or one of the documents above, the list contains a very useful amount of availability information not found in the other compilations:

*International List of Available Electronic Materials, 1976*.  
Available from Defence Research Group, Panel on Physics and  
Electronics, North Atlantic Council, OTAN/NATO, 1110 Brussels,  
Belgium.

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Classes or generic names of materials appear in the index (with a few exceptions) only when so given by the supplier of the information.

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 $YZn$ , 293  
 Yb, 233  
 $YbB_6$ , 17  
 $YbFe_2O_4$ , 372  
 $Yb_2Fe_3O_7$ , 372  
 $Yb(NH_3)_6$ , 17  
 $Yb_2O_3$ , 13
- Zn, 28, 44, 119, 155, 162, 271, 280, 283, 290, 422, 424  
 $Zn_xCd_{1-x}S$ , 88, 126, 399  
 $ZnF_2$ , 200  
 $ZnGa_2O_3$ , 248  
 $Zn_2GeO_4$ , 350  
 $ZnGeP_2$ , 319

|                                                                                                   |                            |
|---------------------------------------------------------------------------------------------------|----------------------------|
| $\text{Zn}_x\text{In}_2\text{S}_4$ , 281                                                          | I-III-VI <sub>2</sub> , 40 |
| $\text{ZnO}$ , 28, 92, 123, 180, 229                                                              | II-IV-V <sub>2</sub> , 40  |
| $\text{Zn}_3\text{P}_2$ , 87, 88                                                                  | II-VI, 305                 |
| $\text{ZnS}$ , 28, 92, 203, 209, 341a, 363, 399,<br>402, 411, 414                                 | III-V, 93                  |
| $\text{ZnSO}_4$ , 321                                                                             |                            |
| $\text{ZnS}_{1-x}\text{Se}_x$ , 196                                                               |                            |
| $\text{ZnSc}_2\text{S}_4$ , 209                                                                   |                            |
| $\text{ZnSe}$ , 28, 71, 92, 135, 194, 203, 209,<br>234, 239, 363, 368, 399                        |                            |
| $(\text{ZnSe})_{1-x}(\text{GaP})_x$ , 210                                                         |                            |
| $\text{Zn}_2\text{SnO}_4$ , 350, 351                                                              |                            |
| $\text{ZnTe}$ , 28, 71, 92, 239, 356, 366, 375,<br>387, 411                                       |                            |
| $\text{Zr}$ , 279                                                                                 |                            |
| $\text{ZrB}_2$ , 337                                                                              |                            |
| $\text{ZrC}$ , 60, 335, 337, 364                                                                  |                            |
| $\text{Zr}_{40}\text{Cu}_{60}$ , 171                                                              |                            |
| $\text{ZrMoFe}_2$ , 325                                                                           |                            |
| $\text{ZrN}$ , 337, 364                                                                           |                            |
| $\text{ZrO}_2$ , 123, 245, 361                                                                    |                            |
| $\text{ZrO}_2\text{-Y}_2\text{O}_3$ , 66                                                          |                            |
| $\text{ZrO}_2(\text{Y}_2\text{O}_3)\text{-Al}_2\text{O}_3(\text{Cr}_2\text{O}_3)\text{-Mo}$ , 183 |                            |
| $\text{ZrP}$ , 337                                                                                |                            |
| $\text{ZrS}_2$ , 337                                                                              |                            |

## ABBREVIATIONS FOR PREPARATION METHODS

|     |                              |
|-----|------------------------------|
| Br  | Bridgman                     |
| CVD | Chemical Vapor Deposition    |
| Cz  | Czochralski                  |
| EC  | Electrocrystallization       |
| EFG | Edge-Defined Film-Fed Growth |
| Flu | Flux                         |
| FZ  | Float Zone                   |
| GE  | Gas Epitaxy                  |
| Hyd | Hydrothermal                 |
| LE  | Liquid Epitaxy               |
| M   | Melt                         |
| MBE | Molecular Beam Epitaxy       |
| Sol | Solution                     |
| St  | Stockbarger                  |
| Sub | Sublimation                  |
| THM | Traveling Heater Method      |
| Ver | Verneuil                     |
| VLS | Vapor-Liquid-Solid           |
| VP  | Vapor Phase                  |
| Z   | Zone Melting                 |

| 1                                                                                                    |              |                                        |                                                                                                                                                                                                          |                                      |
|------------------------------------------------------------------------------------------------------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): M.C. ARST                                                                                   |              |                                        |                                                                                                                                                                                                          |                                      |
| Inst. & Address: Consultant- 2601 Lighthouse Lane, Corona del Mar, CA. 92625 Telephone: 714-640-1242 |              |                                        |                                                                                                                                                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                | METHOD*      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                     | Material<br>Avail-<br>ability<br>+ - |
| Si (silicon)                                                                                         | Cz<br>Z<br>M |                                        | Methods for single crystal growth and<br>crystal characterization- Intrinsic and<br>As, Ga, B, P, In and other doped silicon<br>crystals, IR spectroscopy, IR detectors<br>and misc. other applications. | --                                   |

| 2                                                                                                                                                        |               |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. M. A. Otooni                                                                                                                                |               |                                        |                                                                                                                      |                                      |
| Inst. & Address: 4 Fairview Drive, Glassboro, New Jersey 08028 Telephone:                                                                                |               |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                    | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| BULK COPPER SINGLE CRYSTAL.<br>PREPARED BY A NEW TECHNIQUE<br>IN CERAMIC TUBING.                                                                         | MELTING       | UP TO 150                              | BY CYCLIC MELTING                                                                                                    | +                                    |
| BULK COPPER SINGLE CRYSTAL.<br>PREPARED BY 4 POINTS TIPS.<br>EMPLOYING CZ TECHNIQUE.                                                                     | NEW<br>OTOONI | 100                                    | BY 4 POINTS TIP<br>AND CYCLIC MELTING                                                                                | +                                    |
| THIN SINGLE CRYSTALS OF COPPER.<br>PREPARED BY SEEDING THE<br>SUBSTRATE SURFACE.<br>A COMPLETELY NEW PROCEDURE<br>TO PREPARE 180-300 Å THICK<br>CRYSTAL. | NEW<br>OTOONI | CONTINUOUS<br>SHEET                    | BY SEEDING THE SUBSTRATE                                                                                             | +                                    |

| 3                                                                                                      |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): ROCH R. MONCHAMP                                                                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: ADOLF MELLER COMPANY, PO BOX 6001, PROVIDENCE, RHODE ISLAND Telephone: (401) 331-3717 |         |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Sapphire<br>$\alpha\text{-Al}_2\text{O}_3$                                                             | M       | 200 $\phi$<br>x 130 high               | 99.999% Pure<br>all orientations<br>optical & electronic applications                                                | Stock                                |

| 4                                                                                                           |              |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Judith A. Osmer, A. B. Chase, Elsa Garmire                                                         |              |                                        |                                                                                                                      |                                      |
| Inst. & Address: The Aerospace Corporation, P.O. Box 92957, Los Angeles, CA 90009 Telephone: (213) 648-6973 |              |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                       | METHOD*      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| GaAs                                                                                                        | LE           | 10 x 17 x 1                            | Integrated Optics and Laser                                                                                          | -                                    |
| AlB <sub>6</sub> , CaB <sub>6</sub> , BaB <sub>6</sub> , LaB <sub>6</sub>                                   | M            |                                        | Electron emitter                                                                                                     | -                                    |
| YVO <sub>4</sub>                                                                                            | M and<br>Sol | 2 x 3 x 2                              | Laser                                                                                                                | -                                    |
| Garnets                                                                                                     | Sol          | 7 x 4 x 4                              | Laser                                                                                                                | -                                    |
| CaY <sub>2</sub> Mg <sub>2</sub> GeO <sub>12</sub> - CAMGAR                                                 | Sol          | 3 x 2 x 2                              | Laser                                                                                                                | -                                    |

| <b>5</b><br>Name(s): ALFA DIVISION/VENTRON CORPORATION<br>Inst. & Address: 152 Andover St., Danvers, MA 01923<br>Telephone: (617) 777-1970 |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Silicon monoxide                                                                                                                           | Sub     |                                        | Vapor phase deposition                                                                                               | +                                    |
| Titanium monoxide                                                                                                                          | Sub     |                                        | Vapor phase deposition                                                                                               | +                                    |

| <b>6</b><br>Name(s): Frank J. Bruni, Group Leader, Crystal Growth<br>Inst. & Address: Allied Chemical, Synthetic Crystal Products<br>P. O. Box 2607, Charlotte, NC 28234<br>Telephone: 704-588-2340 |                |                                        |                                                                                                                         |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                               | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.    | Material<br>Avail-<br>ability<br>+ - |
| Gadolinium Gallium Garnet<br>(GGG)                                                                                                                                                                  | C <sub>z</sub> | 85X85X250                              | Material available for sale as magnetic garnet substrates in boule and polished wafer form.                             | Yes                                  |
| Yttrium Aluminum Garnet<br>(YAG)                                                                                                                                                                    | C <sub>z</sub> | 40X40X150                              | Neodymium doped for laser rod applications. Material available in fabricated laser rod form to custom sizes and shapes. | Yes                                  |
| Sapphire                                                                                                                                                                                            | EFG*           | 2X100X1000                             | Material is produced for electronic substrates, windows and wear surfaces and is available in custom sizes and shapes.  | Yes                                  |
| Magnetic Garnet Films                                                                                                                                                                               | LE             | 75mm Dia.                              | Films are commercially available to customer magnetic and physical specifications for magnetic bubble devices.          | Yes                                  |
| Silicon on Sapphire<br>(SOS)                                                                                                                                                                        | GE             | 75mm Dia.                              | Films are commercially available to customer electronic specifications.                                                 | Yes                                  |

| <b>7</b><br>Name(s): M. A. Gilleo, Manager, Optical Physics Department, Corporate Research Center<br>Inst. & Address: Allied Chemical Corporation, P. O. Box 1021R, Morristown, NJ 07960<br>Telephone: (201) 455-4574 |         |                                        |                                                                                                                                                              |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                         | Material<br>Avail-<br>ability<br>+ - |
| $\alpha$ -AlPO <sub>4</sub> (berlinite)                                                                                                                                                                               | Hyd     | 20x20x30                               | Research growth of material for piezo-electric applications with appropriate characterization. B.H.-T. Chai                                                  |                                      |
| Magnetic garnet films                                                                                                                                                                                                 | LE      | 25 mm diam<br>x20 microns              | Magnetic-bubble-domain films on gadolinium garnet substrates; stripe widths $\geq$ 0.5 microns; full characterization. Research growth only. D. M. Gualtieri |                                      |

8

Name(s): James B. McNeely, Manager, Crystal Products

Inst. & Address: Allied Chemical Corp., Corporate Development Center, P.O. Box 1021R,  
Morristown, NJ 07960

Telephone: 201-455-4040

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Gadolinium Gallium Garnet                                             | Cz      | 76 mm dia. x<br>125-250 mm<br>long     | <111> Boules, As-sawn or Polished Wafers.                                                                                               | ✓                                    |
| Rare Earth Garnets                                                    | Cz      | Various                                |                                                                                                                                         | Limited                              |
| Magnetic Garnet Films                                                 | LE      | 76 mm dia.                             | Magnetic property characterizations available.                                                                                          | ✓                                    |
| Lanthanum Beryllate                                                   | Cz      | 20 mm dia. x<br>100 mm long            | Laser Rods - Neodymium - Doped<br>Ref: Applied Phys. Letters, 27, No. 8, 15 Oct.1975,<br>p. 444; J.Appl.Phys. 47, No. 4, 1976, p. 1496. | ✓                                    |
| Chrysoberyl (Alexandrite)                                             | Cz      | Various                                | Doped or Undoped - Ref. U.S. Patent 3,997,853.                                                                                          | Limited                              |
| Yttrium Aluminum Garnet                                               | Cz      | Various                                | Laser Rods - Neodymium - Doped.                                                                                                         | ✓                                    |
| Beryllium Oxide                                                       | Flu     | Various                                | Ref: R.C. Linare, ACCG-IV, Gaithersburg Meeting,<br>1978.                                                                               | Limited                              |

9

Name(s): Allusuisse Metals, Inc.

Inst. & Address: 2460 Lemoine Avenue, P. O. Box 1100,  
Fort Lee, NJ 07024Branch:  
15910 Ventura Blvd.  
Encino, CA 91436Telephone: (201) 461-6660  
(213) 986-5020

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Gallium Metal, Gallium Oxide,<br>Gallium Trichloride                  | Cz      | Various                                | 99.9% to 99.9999%+                                                                                                   | Stock                                |
| Gallium Phosphide, GGG                                                |         |                                        | GGG 3-inch single crystal boule and wafer<br>Gallium Phosphide polycrystalline ingots                                |                                      |
| High-purity Alumina                                                   |         |                                        | 99.99%                                                                                                               |                                      |
| High-purity Aluminum                                                  |         |                                        | 99.999%                                                                                                              |                                      |
| Red Phosphorus                                                        |         |                                        | 99.9999%                                                                                                             |                                      |
| Indium                                                                |         |                                        | 99.9999%                                                                                                             |                                      |

10

Name(s): Howard R. Shanks

Inst. &amp; Address: Ames Laboratory-DOE, Iowa State University, Ames, Iowa 50011

Telephone: (515) 294-6816

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)  | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------|---------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tungsten Bronzes<br>$M_xWO_3$ M = Li, Na, K, Rb, Cs, Tl,<br>Rare Earths | EC      | up to<br>10 x 10 x 10<br>depending on M | High purity various orientations                                                                                     | +                                    |
| Indium Selenide InSe                                                    | Br      | 10 x 10 x 10                            | High purity                                                                                                          | +                                    |
| Niobium Selenide NbSe <sub>2</sub>                                      | VP      | 1 x 3 x 3                               | High purity                                                                                                          | +                                    |

| 11                                                                    |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): A. J. Arko                                                   |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Argonne National Laboratory; Argonne, IL 60439       |         |                                        | Telephone: (312) 972-5018                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $V_3Si$ , $Ti_3Al$ , $UA_2$                                           | Z       | 12 mm x<br>12 mm x 50 mm               | Prepared in an argon atmosphere. Maximum resistance ratio = 30.                                                      | -                                    |
| $URh_3$ , $UIr_3$ , $URu_3$ , $Nb_3Ir$                                | Z       | 6 mm x 6 mm<br>x 50 mm                 | Electron beam zone melting in vacuum. Maximum resistance ratio = 300. Used to study the dHvA effect.                 | -                                    |
| $UGe_3$                                                               | Flu     | 1 mm x 1 mm<br>x 2 mm                  | Maximum resistance ratio = 500.                                                                                      | -                                    |
| $UA_2$ , $UGe_3$ , $Ti_3Au$                                           | Cz      | 3 mm x 3 mm<br>x 10 mm                 | Poor quality                                                                                                         | -                                    |

| 12                                                                                    |             |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------|-------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Norman L. Peterson, W. K. Chen                                               |             |                                        |                                                                                                                      |                                      |
| Inst. & Address: Materials Science Division, Argonne National Lab., Argonne, IL 60439 |             |                                        | Telephone: (312) 972-4955                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                 | METHOD*     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $<FeO>$ , $NiO$ , $CoO$<br>$MnO$ , $(Ni,Co)O$<br>$(Ni,Cr)O$                           | <u>Ver.</u> | 10x10x10                               | 99.99% pure<br>Electrical conductivities,<br>Cation and Anion diffusions<br>Defect properties                        |                                      |
| $CoFe_2O_4$                                                                           | <u>Ver.</u> | 3x3x3                                  | 99.99% pure<br>Electrical conductivities,<br>Cation diffusions, defect properties                                    |                                      |
| $Fe_3O_4$                                                                             | <u>M</u>    | 10x10x10                               | 99.99% pure<br>Cation diffusions, defect properties                                                                  |                                      |

| 13                                                                                                                             |                      |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Sherman Susman and David G. Hinks                                                                                     |                      |                                        |                                                                                                                      |                                      |
| Inst. & Address: Argonne National Laboratory, Solid State Science Division<br>9700 S. Cass Avenue, Argonne, Illinois 60439 USA |                      |                                        | Telephone: 972-5470                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                          | METHOD*              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| KCN                                                                                                                            | <u>Cz</u>            | 15 x 15 x 30                           | High purity; zone refined                                                                                            | +                                    |
| NaCN                                                                                                                           | <u>Cz</u>            | 15 x 15 x 30                           | High purity; zone refined                                                                                            | -                                    |
| KCN:KBr solid solution                                                                                                         | <u>Cz</u>            | 15 x 15 x 30                           | High purity; zone refined                                                                                            | +                                    |
| $Y_2O_3$ (Yttria)                                                                                                              | Float <u>z</u>       | 4 x 4 x 4                              | High purity; undoped                                                                                                 | -                                    |
| $Dy_2O_3$ (Dysprosia)                                                                                                          | Float <u>z</u>       | 4 x 4 x 4                              | High purity; undoped                                                                                                 | -                                    |
| $Er_2O_3$ (Erbia)                                                                                                              | Float <u>z</u>       | 4 x 4 x 4                              | High purity; undoped                                                                                                 | -                                    |
| $Yb_2O_3$ (Ytterbia)                                                                                                           | Float <u>z</u>       | 4 x 4 x 4                              | High purity; undoped                                                                                                 | -                                    |
| KCl                                                                                                                            | <u>z</u> , <u>Cz</u> | 20 x 20 x 50                           | Ultrahigh purity. Fractionally crystallized,<br>halogen-treated and zone refined.                                    | +                                    |
| $Y(EtSO_4)_3$ (Yttrium ethylsulfate)                                                                                           | <u>Sol</u>           | 25 x 25 x 25                           | Pure and with Yb dopant                                                                                              | +                                    |
| $CeSn_3$                                                                                                                       | <u>Cz</u>            | 10 x 10 x 30                           |                                                                                                                      | +                                    |
| $LiAl$                                                                                                                         | <u>Cz</u>            | 5 x 5 x 5                              |                                                                                                                      | -                                    |
| PrAg                                                                                                                           | <u>Cz</u>            | 10 x 10 x 10                           |                                                                                                                      | +                                    |
| NdAg                                                                                                                           | <u>Cz</u>            | 10 x 10 x 10                           |                                                                                                                      | +                                    |

| 14                                                                                          |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): G. W. Crabtree                                                                     |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Solid State Science Division<br>Argonne National Lab., Argonne, ILL. 60439 |         |                                        | Telephone: 312-972-5509                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Niobium                                                                                     | M,Z     | 1 x 1 x 3                              | RRR $\lambda$ 2500, High temp, High vacuum<br>anneal. Used for de Haas-van Alphen<br>experiments.                    | -                                    |

| 15                                                                                              |         |                                        |                                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Charles M. Falco and Robert T. Kampwirth                                               |         |                                        |                                                                                                                                      |                                      |
| Inst. & Address: Solid State Science Division, Argonne National Lab., Argonne<br>Illinois 60439 |         |                                        | Telephone: (312) 972-5482                                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                 | Material<br>Avail-<br>ability<br>+ - |
| Nb <sub>3</sub> Sn, Nb <sub>3</sub> Ge, and NbN                                                 | VP      | 75x75x0.002                            | Superconductive properties of poly-<br>crystalline sputtered films. TEM, SEM,<br>and Rutherford backscattering analysis<br>of films. | +                                    |

| 16                                                                                    |         |                                        |                                                                                                                                                                                                                                                                                                         |                                      |
|---------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): William S. Glaunsinger                                                       |         |                                        |                                                                                                                                                                                                                                                                                                         |                                      |
| Inst. & Address: Arizona State University, Department of Chemistry<br>Tempe, AZ 85281 |         |                                        | Telephone: (602) 965-7155                                                                                                                                                                                                                                                                               |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| Pt<br>Platinum                                                                        | S       | 2x10 <sup>-7</sup> dia.                | >99% pure; dopants - none, properties studied -<br>electron spin resonance, magnetic susceptibility,<br>chemisorption; characterization - electron micros-<br>copy, X-ray; applications - catalysis.<br>M. Bayard, R. F. Marzke, and W. S. Glaunsinger,<br>Solid State Commun. <u>18</u> , 1025 (1976). | +                                    |
| VO <sub>2</sub><br>vanadium dioxide                                                   | Sub     | 0.3x0.3x0.3                            | >99% pure; dopants - gallium; properties studied -<br>electron spin resonance, thermodynamic, electrical;<br>characterization - X-ray, electron microscopy,<br>electron microprobe; applications - thermal switches.                                                                                    | -                                    |

| <b>17</b><br>Name(s): William S. Glaunsinger<br>Inst. & Address: Arizona State University, Department of Chemistry<br>Tempe, AZ 85281<br>Telephone: (602) 965-7155                   |                |                                        |                                                                                                                                                                                                                                                                                                                                                                                    |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
| M(NH <sub>3</sub> ) <sub>6</sub> , M=Ca, Sr, Ba, Eu, Yb<br>Alkaline earth hexammines<br>Li(NH <sub>3</sub> ) <sub>4</sub> -lithium tetraamine                                        | M              | powder                                 | >99% pure, dopants - none; properties studied - magnetic resonance and susceptibility, neutron diffraction, electrical; characterization - chemical, neutron diffraction; applications - batteries, purification of ammonia.<br>W. S. Glaunsinger, T. K. White, R. B. Von Dreele, D. A. Gordon, R. F. Marzke, A. L. Bowman, and J. L. Yarnell, Nature <u>271</u> , 414-417 (1978). | +                                    |
| Ca <sub>2</sub> MnO <sub>4</sub> , Ca <sub>3</sub> Mn <sub>2</sub> O <sub>7</sub> , Ca <sub>4</sub> Mn <sub>3</sub> O <sub>10</sub> , CaMnO <sub>3</sub><br>calcium-manganese oxides | HYD<br>Ceramic | powder                                 | >99% pure, dopants - none; properties studied - electron spin resonance, neutron diffraction, electrical, thermogravimetric; characterization - chemical, X-ray fluorescence, X-ray, neutron activation, electron microscopy; applications - catalysis, electrocatalysis.                                                                                                          | +                                    |
| MB <sub>6</sub> , M = Eu, Yb, Gd<br>metal hexaborides                                                                                                                                | Ceramic        | powder                                 | >99% pure; dopants - none; properties studied - electron spin resonance; characterization - X-ray; applications - high temperature electrodes.<br>W. S. Glaunsinger, J. Chem. Phys. Solids <u>37</u> , 51-57 (1978).                                                                                                                                                               | -                                    |
| M <sub>x</sub> V <sub>2</sub> O <sub>5</sub> , M=Cu, Na, Cr vanadium bronzes                                                                                                         | M              | 0.1×0.1×4                              | >99% pure; dopants - none; properties studied - electron spin resonance, optical, infrared, magnetic susceptibility; characterization - chemical, neutron activation, X-ray; applications-varister.                                                                                                                                                                                | -                                    |
| (Mo <sub>x</sub> V <sub>1-x</sub> ) <sub>2</sub> O <sub>5</sub> molybdenum-vanadium oxides                                                                                           | Sub            | 0.1×0.1×0.4                            | 99% pure, dopants - none; properties studied - electron spin resonance, optical, infrared, magnetic susceptibility; characterization - chemical, neutron activation, X-ray; applications - catalysis.                                                                                                                                                                              | -                                    |

| <b>18</b><br>Name(s): Neal R. Armstrong<br>Inst. & Address: Department of Chemistry, University of Arizona, Tucson, AZ 85721<br>Telephone: |         |                                        |                                                                                                                                                                                                                                                                                                   |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
| Titanium Dioxide (Rutile)<br>Strontium Titanate                                                                                            | M<br>M  | 5 x 5 x 5<br>5 x 5 x 5                 | X-ray photoelectron and Auger electron spectroscopic study of surface composition of TiO <sub>2</sub> , titanium oxides, SrTiO <sub>3</sub> and above materials reduced in H <sub>2</sub> and used for photoelectrolysis of water. (C. N. Sayers and N. R. Armstrong, Surface Science, in press). | -                                    |

| <b>19</b><br>Name(s): S. Sari<br>Inst. & Address: Optical Sciences Center, University of Arizona, Tucson, AZ 85721<br>Telephone: (602) 626-3025 |         |                                        |                                                                                                                                                   |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                              | Material<br>Avail-<br>ability<br>+ - |
| Silicon and Silicon Oxide Embedded<br>in Silicon                                                                                                | VP      | 10 × 10 ×<br>10 <sup>-2</sup> mm       | Phys. Rev. B <u>15</u> , 4817 (1977)<br>AIP Conference Series #40, p. 317<br>J. Phys. Chem. Solids (in press, 1978)<br>Physica B (in press, 1978) | -                                    |
| Silver Oxide and Silver                                                                                                                         | EC      | 10 × 10 × a<br>few mono-<br>layers.    | Surface plasmons and related effects                                                                                                              | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <u>SINGLE CRYSTALS:</u><br><br>Aluminum<br>Aluminum Fluoride<br>Aluminum Oxide<br>(Ruby and Sapphire)<br>Ammonium Hydrogen Phosphate<br>(ADP)<br>Anthracene<br>Antimony<br>Barium Fluoride<br>Barium Oxide<br>Barium Sodium Niobate<br>(Banana)<br>Barium Titanate<br>Beryllium<br>Bicrystals<br>Bismuth<br>Bismuth Germanium Oxide<br>Bismuth Silicon Oxide<br>Cadmium<br>(con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cadmium Fluoride<br>Cadmium Mercury Telluride<br>Cadmium Selenide<br>Cadmium Sulfide<br>Cadmium Sulfoselenide<br>Cadmium Telluride<br>Calcium Carbonate<br>(Gypsum)<br>Calcium Fluoride<br>Calcium Oxide<br>Calcium Tungstate<br>Carbon (Diamond)<br>Cerium Dioxide<br>Cesium Bromide<br>Cesium Chloride<br>Cesium Iodide<br>Cesium Magnesium Fluoride<br>Cesium Manganese Fluoride<br>Chromium<br>Chromium Fluoride (con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Chromium Oxide<br>Cobalt<br>Cobalt Oxide<br>Columbium<br>Copper<br>Dysprosium<br>Erbium<br>Europium<br>Gadolinium<br>Gadolinium Gallium Garnet<br>Gadolinium Molybdate<br>Gallium Antimonide<br>Gallium Arsenide<br>Gallium Fluoride<br>Gallium Oxide<br>Gallium Phosphide<br>Garnets<br>Germanium<br>tri Glycine Sulfate<br>Gold<br>(con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Hafnium<br>Hafnium Oxide<br>Indium<br>Indium Antimonide<br>Indium Arsenide<br>Indium Phosphide<br>Iodic Acid<br>Iridium<br>Iron<br>Iron Oxide<br>KRS-5<br>Lanthanum Fluoride<br>Lead<br>Lead Molybdate<br>Lead Oxide<br>Lead Selenide<br>Lead Telluride<br>Lithium Bromide<br>Lithium Chloride<br>Lithium Fluoride (con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Lithium Iodate<br>Lithium Niobate<br>Lithium Sulfate<br>Lithium Tantalate<br>Magnesium<br>Magnesium Aluminate<br>(Spinel)<br>Magnesium Fluoride<br>Magnesium Oxide<br>Manganese Fluoride<br>Manganese Oxide<br>Mercury Telluride<br>Molybdenum<br>Molybdenum Oxide<br>Naphthalene<br>Nickel<br>Nickel Fluoride<br>Nickel Oxide<br>Palladium<br>Platinum<br><br>(con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                                                                                           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Potassium Bromide<br>Potassium Chloride<br>Potassium Iodide<br>Potassium Deuterophosphate<br>Potassium Fluoride<br>Potassium Hydrogen Phosphate<br>Potassium Magnesium Fluoride<br>Potassium Manganese Fluoride<br>Proustite<br>Quartz<br>Rhenium<br>Rhodium<br>Rochelle Salt<br>Rubidium Chloride<br>Rubidium Bromide<br>Rubidium Iodide<br>Rubidium Magnesium Fluoride<br>Rubidium Manganese Fluoride<br>Ruthenium<br>Scandium<br><br>(con't) |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Silicon                                                               |         |                                        |                                                                                                                      |                                      |
| Silicon Carbide                                                       |         |                                        |                                                                                                                      |                                      |
| Silicon Dioxide                                                       |         |                                        |                                                                                                                      |                                      |
| Silver                                                                |         |                                        |                                                                                                                      |                                      |
| Silver Arsenic Sulfide<br>(Proustite)                                 |         |                                        |                                                                                                                      |                                      |
| Silver Bromide                                                        |         |                                        |                                                                                                                      |                                      |
| Silver Chloride                                                       |         |                                        |                                                                                                                      |                                      |
| Sodium Bromide                                                        |         |                                        |                                                                                                                      |                                      |
| Sodium Chloride                                                       |         |                                        |                                                                                                                      |                                      |
| Sodium Fluoride                                                       |         |                                        |                                                                                                                      |                                      |
| Sodium Iodide                                                         |         |                                        |                                                                                                                      |                                      |
| Spinel                                                                |         |                                        |                                                                                                                      |                                      |
| trans-Stilbene                                                        |         |                                        |                                                                                                                      |                                      |
| Strontium Barium Niobate                                              |         |                                        |                                                                                                                      |                                      |
| Strontium Fluoride                                                    |         |                                        |                                                                                                                      |                                      |
| Strontium Oxide                                                       |         |                                        |                                                                                                                      |                                      |
| Strontium Titanate                                                    |         |                                        |                                                                                                                      |                                      |
| Tantalum                                                              |         |                                        |                                                                                                                      |                                      |
| Tellurium                                                             |         |                                        |                                                                                                                      |                                      |
| Tellurium Oxide<br>(con't)                                            |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Thallium Bromide                                                      |         |                                        |                                                                                                                      |                                      |
| Thallium Bromide/Iodide<br>(KRS-5)                                    |         |                                        |                                                                                                                      |                                      |
| Thallium Chloride                                                     |         |                                        |                                                                                                                      |                                      |
| Thorium Oxide                                                         |         |                                        |                                                                                                                      |                                      |
| Tin                                                                   |         |                                        |                                                                                                                      |                                      |
| Titanium                                                              |         |                                        |                                                                                                                      |                                      |
| Titanium Dioxide                                                      |         |                                        |                                                                                                                      |                                      |
| Tri Glycine Sulfate                                                   |         |                                        |                                                                                                                      |                                      |
| Tungsten                                                              |         |                                        |                                                                                                                      |                                      |
| Tungsten Oxide                                                        |         |                                        |                                                                                                                      |                                      |
| Uranium Dioxide                                                       |         |                                        |                                                                                                                      |                                      |
| Vanadium                                                              |         |                                        |                                                                                                                      |                                      |
| Vanadium Oxide                                                        |         |                                        |                                                                                                                      |                                      |
| Yttrium Aluminum Garnet<br>(YAG)                                      |         |                                        |                                                                                                                      |                                      |
| Yttrium Aluminum Perovskite                                           |         |                                        |                                                                                                                      |                                      |
| Yttrium Gallium Garnet                                                |         |                                        |                                                                                                                      |                                      |
| Yttrium Iron Garnet                                                   |         |                                        |                                                                                                                      |                                      |
| Yttrium Lithium Fluoride                                              |         |                                        |                                                                                                                      |                                      |
| Yttrium Oxide<br>(con't)                                              |         |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Zinc<br>Zinc Oxide<br>Zinc Selenide<br>Zinc Sulfide<br>Zinc Telluride<br>Zirconium<br>Zirconium Oxide<br><br>Ultra high purity elements<br>and inorganic compounds of<br>many types. |         |                                        |                                                                                                                      |                                      |

29

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Triglycine Sulphate<br>(CH <sub>2</sub> NH <sub>2</sub> COOH) <sub>3</sub> H <sub>2</sub> SO <sub>4</sub>            | <u>Sol</u> | a = 67.5<br>b = 80<br>c = 38           | Undoped, single crystal grown with b-axis<br>vertical, pyroelectric coefficient dielec-<br>tric constant & loss tangent measured,<br>fabricated into high sensitivity pyroelec-<br>tric detectors.<br><br>American Ceramic Society Bulletin<br>Vol 46, No. 8, Aug 7 (1967)  | -                                    |
| Deuterated Triglycine Sulphate<br>(CD <sub>2</sub> NH <sub>2</sub> COOD) <sub>3</sub> D <sub>2</sub> SO <sub>4</sub> | <u>Sol</u> | a = 51.5<br>b = 81.5<br>c = 35         | Undoped, single crystal grown with b-axis<br>vertical, pyroelectric coefficient dielec-<br>tric constant & loss tangent measured,<br>fabricated into high sensitivity pyroelec-<br>tric detectors.<br><br>American Ceramic Society Bulletin<br>Vol 46, No. 8, Aug. 7 (1967) |                                      |

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Name(s): William Rolls

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Lead Tin Telluride<br>Pb <sub>x</sub> Sn <sub>1-x</sub> Te<br>x = 0.83, 0.79 or 0.75 | VP      | 20 mm dia<br>40 mm long                | Single crystal, undoped, (100) along growth<br>axis, electrical characteristics, (e.g.,<br>mobility, carrier density) used to fabricate<br>high sensitivity infrared detectors at 77°K,<br>characterized for responsivity, quantum<br>efficiency, 1/f noise and D* | -                                    |

31

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Titanium Dioxide<br>( $\text{TiO}_2$ )                                | VP<br>(Sputter<br>Deposition) | 50 x 50 x<br>0.0001<br>(thin films)    | Basic materials study of optical properties vs. structure and stoichiometry and development of damage-resistant coatings for laser optics; reactive sputter deposition of 99.99% Ti metal in 99.999% Ar/ $\text{O}_2$ mixtures; properties studied include refractive index (350 - 1500 nm) and absorption coefficient near band edge; characterization includes phase composition (anatase/rutile), preferred crystallographic orientation and grain size by both x-ray diffraction and TEM, surface topography by SEM, and stoichiometry by optical absorption near band edge.<br><br>W.T. Pawlewicz and H. Laegreid, "Electrical and Optical Properties of Sputter-Deposited Materials," in Proceedings of Society of Photo-Optical Instrumentation Engineers Technical Symposium East 1978, Washington, D.C. (March 1978), Volume 140, Optical Coatings-Applications and Utilization II. | +                                    |

32

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Amorphous Silicon:Hydrogen<br>(a-Si:H)                                | VP<br>(Sputter<br>Deposition) | 20 x 20 x<br>0.001<br>(thin films)     | Basic materials study to aid development of solar photovoltaic technology; study of electrical, optical and photoelectronic properties--their dependence on positional and compositional disorder, their range of variation and their controlled manipulation by sputtering; electronic-grade single-crystal source material sputtered in 99.9995% $\text{H}_2/\text{Ar}$ mixtures; some work with 0-1000 ppm P or B dopants; properties studied include resistivity vs. temperature (0 - 300°C), spectral dependence of photoconductivity (350 - 1500 nm), refractive index (350 - 1500 nm) and absorption coefficient near band edge; composition characterized by SIMS. | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)           | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|--------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Al}_2\text{O}_3$ (sapphire)                                    | Z<br>( $\text{CO}_2$<br>laser) | 25-250 $\mu\text{m}$<br>dia<br>5-30 cm<br>length | <111>, <100> fibers                                                                                                                                                                                                                                                                                                     | (-)                                  |
| $\text{Cr}:\text{Al}_2\text{O}_3$ (ruby)                              | Z<br>( $\text{CO}_2$<br>laser) | "                                                | Laser quality fibers, 0.02% Cr.<br>"Growth of Single-crystal sapphire-clad<br>Ruby Fibers", C. A. Burrus and<br>L. A. Coldren, Appl. Phys. Lett. <u>31</u> , 383<br>(1977).<br>"Room-temperature Continuous Operation of<br>a Ruby Fiber Laser", C. A. Burrus and<br>J. Stone, J. Appl. Phys., <u>49</u> , 3118 (1978). | (-)                                  |
| YAG and Nd:YAG<br>(yttrium aluminum garnet)                           | Z<br>( $\text{CO}_2$<br>laser) | "                                                | <111>, <100> laser-quality fibers, 1% Nd<br>"Self-contained LED-pumped Single-Crystal<br>Nd:YAG Fiber Laser", J. Stone and<br>C. A. Burrus, Fiber and Integrated Optics<br><u>2</u> , 19 (1978).                                                                                                                        | (-)                                  |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)      | METHOD*                        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)             | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------|--------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Nd}:\text{Y}_2\text{O}_3$ (neodymium doped<br>yttria)               | Z<br>( $\text{CO}_2$<br>laser) | 60-120 $\mu\text{m}$<br>dia<br>5 cm<br>length      | 0.5-3% Nd doped yttria fibers -<br>Laser quality; fluorescence lifetime,<br>fluorescence and absorption spectra,<br>laser action<br>"Nd:Y <sub>2</sub> O <sub>3</sub> Single-crystal Fiber Laser: Room-<br>temperature CW Operation at 1.07 and<br>1.35 $\mu\text{m}$ Wavelength", J. Stone and<br>C. A. Burrus, J. Appl. Phys. <u>49</u> , 2281<br>(1978). | (-)                                  |
| $\text{LiTaO}_3$ (lithium tantalate)<br>$\text{LiNbO}_3$ (lithium niobate) | Z<br>( $\text{CO}_2$<br>laser) | 150-250 $\mu\text{m}$<br>dia<br>10-15 cm<br>length | A, B and C-axis Fiber Crystals<br>No other information or publication                                                                                                                                                                                                                                                                                       | (-)                                  |

| <b>35</b><br>Name(s): Uri Cohen<br>Inst. & Address: Bell Tel. Laboratories<br>Murray Hill, N.J. 07974<br>Telephone: (201)582-5039 |         |                                        |                                                                                                                                                                                                                                                                     |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                | Material<br>Avail-<br>ability<br>+ - |
| Epitaxial-Ge                                                                                                                      | GE      | 20x10x0.01                             | CVD of organo-Ge compound, tetraethyl germ-<br>anium (TEG). Found less than 20 ppm of C<br>contamination. U. Cohen, Y. Avigal and M.<br>Schieber, ICCG-III Meeting (abst. #D4-4),<br>Marseilles, France, July 1971, and U. Cohen,<br>M.S. Thesis, Jerusalem (1971). | -                                    |
| Epitaxial-Si                                                                                                                      | EC      | 25x12x0.02                             | (111) orientation, 99.99% pure, p-type.<br>U. Cohen, U.S. Pat. 3,983,012 (1976), and<br>J. Elect. Mats. 6,607(1977).                                                                                                                                                | -                                    |
| Polycrystalline-Si                                                                                                                | EC      | 25x12x0.04                             | Continuous and adherent films with up to<br>40-50μ grain diameter, p-type, 99.99% pure.<br>U. Cohen, pending U.S. Pat., and J. Elect.<br>Mats. 6,607(1977).                                                                                                         | -                                    |
| Nb-Ge alloys                                                                                                                      | EC      | 25x12x0.04                             | Composition, crystal structure, and super-<br>conductivity. U. Cohen, Ph.D. Thesis,<br>Stanford (1977).                                                                                                                                                             | -                                    |
| NbO and NbO <sub>2</sub>                                                                                                          | EC      | 25x12x0.1                              | Composition, crystal structure, and super-<br>conductivity. U. Cohen, Ph.D. Thesis,<br>Stanford (1977).                                                                                                                                                             | -                                    |
| Refractory metal (W, Mo, Nb,<br>V) silicides                                                                                      | EC      | 25x12x.05                              | Composition, crystal structure, and super-<br>conductivity. U. Cohen, Ph.D. Thesis,<br>Stanford (1977).                                                                                                                                                             | -                                    |

| <b>36</b><br>Name(s): Kurt Nassau<br>Inst. & Address: Bell Laboratories, Murray Hill, NJ 07974<br>Telephone: (201) 582-2589 |                |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                       | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| RE Iodates }<br>TR Iodates }                                                                                                | Gel }<br>sol } | 5 max                                  | Structure, Optic Props., Magnetic Props.,<br>etc.                                                                    | -                                    |
| SbSI                                                                                                                        | Flu            | 5x5x30                                 | Structure, etc.                                                                                                      | -                                    |
| K <sub>2</sub> Cd <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>                                                              | M              | 5x5x10                                 | Structure, ferroelastic transitions, etc.                                                                            | -                                    |

| <b>37</b><br>Name(s): J. C. Bean<br>Inst. & Address: Bell Laboratories, Murray Hill, N. J. 07974<br>Telephone: (201)582-3324 |         |                                        |                                                                                                                                                                                                                                                                                                                                                             |                                      |
|------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
| Silicon Molecular Beam Epitaxy                                                                                               | MBE     | 50x50x10 <sup>-2</sup>                 | - (100) and (111) orientation<br>- Hyperabrupt doping profiles from 10 <sup>14</sup> /cm <sup>3</sup> -<br>5x10 <sup>18</sup> /cm <sup>3</sup><br>- Dopants Al, As, Ga, Sb<br><br>Publications:<br>J. C. Bean, G. E. Becker, P. M. Petroff, T. E.<br>Seidel, J. Appl. Phys. 48, 907 (1977).<br>G. E. Becker, J. C. Bean, J. Appl. Phys. 48, 3395<br>(1977). |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| InP                                                                   | GE      | 20x20x                                 | on InP substrates                                                                                                    |                                      |
| $\text{In}_{1-x}\text{Ga}_x\text{As}_y\text{P}_{1-y}$                 | GE      | $10^{-2}$                              | (100) - $1\frac{1}{2}^\circ$ + (110). HCl transport.                                                                 |                                      |
| GaAs                                                                  | GE      | 40x40x                                 | on GaAs (100) - $2-4^\circ$ + (110)                                                                                  |                                      |
| $\text{Al}_x\text{Ga}_{1-x}\text{As}$                                 | GE      | $10^{-2}$                              | by $(\text{CH}_3)_3\text{Ga} + \text{AsH}_3 + (\text{CH}_3)_3\text{Al}$ reaction.                                    |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GaAs, gallium-arsenide                                                | Sol, LE | $10 \times 10 \times .01$              | $10^{16}-10^{19}$ , (100), (111), microwave devices,<br>LEDs, laser diodes                                           | Yes                                  |
| AlGaAs, aluminum-gallium-<br>arsenide                                 | Sol, LE | $10 \times 10 \times .01$              | $10^{16}-10^{19}$ , (100), (111), microwave devices,<br>LEDs, laser diodes                                           | Yes                                  |
| InP, indium-phosphide                                                 | Sol, LE | $10 \times 10 \times .01$              | $10^{16}-10^{19}$ , (100), (111), microwave devices,<br>LEDs, laser diodes                                           | Yes                                  |
| InGaAsP, indium-gallium-<br>arsenide-phosphide                        | Sol, LE | $10 \times 10 \times .01$              | $10^{16}-10^{19}$ , (100), (111), microwave devices,<br>LEDs, laser diodes                                           | Yes                                  |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD*              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------|----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| p, n-type, and seminsulating<br>InP                                                       | CZ LEC               | 1"Dx2"                                 | <111> and <100>, Zn, Cd, Sn dopants                                                                                  | -                                    |
| $\text{V}_3\text{Si}, \text{V}_3\text{Ge}$                                                | CZ<br>Cold<br>Hearth | 1/4"Dx1"                               | <111> and <100>, Resistance ratios of<br>12 to 20                                                                    | -                                    |
| R E Garnets                                                                               | Flu,<br>CZ           | All sizes<br>up to 1"D                 |                                                                                                                      | -                                    |
| $\text{LiNbO}_3$ , $\text{LiTaO}_3$ , re Molybdates,<br>ex: $\text{Tb}_2(\text{MoO}_4)_3$ | CZ                   | All sizes<br>up to 1"D                 |                                                                                                                      | -                                    |
| Transition Metal Dichalcogenides                                                          | VP                   |                                        |                                                                                                                      | -                                    |
| $\text{Pb}_4\text{Ge}_3\text{O}_{11}$                                                     | CZ                   | up to 1"D                              |                                                                                                                      | -                                    |
| I III $\text{VI}_2$ and II IV $\text{V}_2$<br>Chalcopyrites                               | M, VP                |                                        |                                                                                                                      | -                                    |

| 41                                                                      |                                                      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
|-------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Randall Caton                                                  |                                                      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Inst. & Address: Brookhaven National Laboratory, Upton, NY 11973        |                                                      |                                        | Telephone: 516-345-3502                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)   | METHOD*                                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
| $Nb_{3+y}Al_xSi_{1-x-y}$<br><br>$0 \leq x \leq 1$<br>$0 \leq y \leq .6$ | M<br>Rapidly<br>Quenched from<br>$\sim 2000^\circ C$ | 1 mm x 1 mm<br>x 1 mm                  | Purity of starting materials: Nb 99.995%, Al 99.9% Si semiconductor grade. The samples are in the A-15 structure and characterized by x-ray diffraction, electron microprobe, and metallography. The superconducting transition temperature was measured as a function of silicon content. The samples are high temperature superconductors (with $T_c$ as high as 18.6 K) and are desirable to study in regards to producing high temperature superconductors.<br><br>Publications: R. Caton and A. R. Sweedler, J. Less Comm. Met. 60, 91 (1978); C. S. Pande, R. Caton, S. Moehlecke, J. Mat. Sci. 11, 2338 (1976). | Not<br>avail-<br>able                |

| 42                                                                                                                                                            |                           |                                          |                                                                                                                                                              |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Jan Tauc                                                                                                                                             |                           |                                          |                                                                                                                                                              |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                         | METHOD*                   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)   | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                         | Material<br>Avail-<br>ability<br>+ - |
| Amorphous hydrogenated Si                                                                                                                                     | Sputtering glow-discharge | $20 \times 20 \times 10^{-2}$<br>(films) | Electronic relaxation processes<br>Photo-modulation experiments<br>Optical and transport properties of Si:H doped with noble or transition metals            | -                                    |
| Metallic glasses:<br>metal-metalloid, such as<br>$Pd_{78}Ge_{22}$ , $Pd_{78}Cu_6Si_{16}$<br><br>transition metal-transition metal,<br>such as<br>Nb:Ni, Ti:Ni | Splat cooling of melt     | $20 \times 4 \times 1$                   | Structure by EXAFS (Phys. Rev. Lett. 40, 1282 (1978))<br>Photoemission (Phys. Rev. B13, 3284 (1976); Solid State Comm. 22, 471 (1977))<br>Optical properties | -                                    |
| Amorphous metallic films<br>$Au_{1-x}Si_x$ , $0.12 \leq x \leq 1$                                                                                             | Sputtering                | $20 \times 20 \times 10^{-3}$            | Optical properties (Phys. Rev. Lett. 40, 1733 (1978))                                                                                                        | -                                    |

| 43                                                                                                                                      |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): George R. Rossman                                                                                                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Division of Geological and Planetary Sciences 170-25<br>California Institute of Technology, Pasadena, California 91125 |         |                                        | Telephone: (213) 795-6811<br>Extension 2471                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Minerals, natural and synthetic.<br>Silicates, phosphates, arsenates,<br>iron and manganese oxides.                                     |         |                                        | optical and infrared spectroscopy:<br>anisotropy, color, site occupancy, $H_2O$ content                              |                                      |

| <b>44</b><br>Name(s): DR. SHELDON SCHULTZ<br>Inst. & Address: DEPARTMENT OF PHYSICS, B-019<br>UNIVERSITY OF CALIFORNIA, SAN DIEGO LA JOLLA CA 92093 Telephone (714) 452-4078 |         |                                        |                                                                                                                                             |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                        | Material<br>Avail-<br>ability<br>+ - |
| Cu, Ag, Au, Mg, Zn, Cd, In, Sn                                                                                                                                               | BR      | 10 x 10 x 20                           | ULTRA HIGH PURITY OR LESS THAN 100 PPM LOCAL<br>MOMENT DOPANTS.<br><br>RESISTIVITY RATIO AND ELECTRON SPIN RESONANCE<br>PROPERTIES STUDIED. | NEGOTIABLE                           |

| <b>45</b><br>Name(s): G. W. Webb, Z. Fisk<br>Inst. & Address: Institute for Pure and Applied Physical Sciences,<br>University of California, San Diego, La Jolla, CA 92093 Telephone: (714) 452-4785 |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Nb <sub>3</sub> Sb                                                                                                                                                                                   | VP      | 15 x 10 x 5                            | DHVA, neutron scattering, others                                                                                     | +                                    |
| Nb <sub>3</sub> Sn                                                                                                                                                                                   | VP      | 4 x 2 x 2                              | DHVA, neutron scattering, others                                                                                     | +                                    |

| <b>46</b><br>Name(s): R. A. Fisher, G. E. Brodale, E. W. Hornung, and W. F. Giaque<br>Inst. & Address: University of California, Low Temperature Laboratory, Berkeley, CA 94720 Telephone: (415) 642-2985 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Material<br>Avail-<br>ability<br>+ - |
| MnCl <sub>2</sub><br>Manganous Chloride                                                                                                                                                                   | Br      | 3.3 cm dia<br>sphere                   | PURITY: (wt. ppm) 5 Mg, 5 Si, 1 Cu.<br>(emission spectroscopy)<br>ORIENTATION: $\alpha$ crystal axis.<br>PROPERTIES STUDIED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 100,000 G.<br>TEMPERATURE RANGE: 1.3 to 4.2°K.<br><br>1. R. A. Butera and W. F. Giaque, J. Chem. Phys. <u>40</u> , 2379 (1964).<br>2. W. F. Giaque, G. E. Brodale, R. A. Fisher, and E. W. Hornung, J. Chem. Phys. <u>42</u> , 1 (1965).<br>3. W. F. Giaque, R. A. Fisher, E. W. Hornung, R. A. Butera, and G. E. Brodale, J. Chem. Phys. <u>42</u> , 9 (1965).<br>4. W. F. Giaque, E. W. Hornung, R. A. Fisher, and G. E. Brodale, J. Chem. Phys. <u>42</u> , 853 (1965).<br>5. W. F. Giaque, R. A. Fisher, E. W. Hornung, and G. E. Brodale, J. Chem. Phys. <u>43</u> , 4387 (1965). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\alpha\text{-MnCl}_2 \cdot 4\text{H}_2\text{O}$<br>Manganous Chloride Tetrahydrate | Sol     | 3.934 cm dia<br>sphere                 | PURITY: (wt. ppm) 5 Mg, 5 Si, 1 Cu, 0.1 Fe.<br>(emission spectroscopy)<br>ORIENTATION: <i>c</i> , <i>b</i> , [100] crystal axis.<br>PROPERTIES STUDIED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.4 to 4.2°K.<br><br>1. T. A. Reichert and W. F. Giaque, J. Chem. Phys. <u>50</u> , 4205 (1969).<br>2. W. F. Giaque, R. A. Fisher, G. E. Brodale, and<br>E. W. Hornung, J. Chem. Phys. <u>52</u> , 2901 (1970).<br>3. W. F. Giaque, E. W. Hornung, G. E. Brodale, and<br>R. A. Fisher, J. Chem. Phys. <u>52</u> , 3936 (1970).<br>4. W. F. Giaque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>53</u> , 1474 (1970). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{NiSiF}_6 \cdot 6\text{H}_2\text{O}$<br>Nickel Fluosilicate Hexahydrate | Sol     | 2.498 cm dia<br>sphere                 | PURITY: (wt. ppm) 2.4 Na.<br>(emission spectroscopy and neutron activation)<br>ORIENTATION: <i>c</i> and $\perp c$ axis.<br>PROPERTIES STUDIED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.05 to 4.2°K.<br><br>1. E. W. Hornung, G. E. Brodale, R. A. Fisher, and<br>W. F. Giaque, J. Chem. Phys. <u>45</u> , 614 (1966).<br>2. E. W. Hornung, R. A. Fisher, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>45</u> , 2011 (1966).<br>3. E. W. Hornung, R. A. Fisher, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>46</u> , 67 (1967).<br>4. W. F. Giaque, E. W. Hornung, G. E. Brodale, and<br>R. A. Fisher, J. Chem. Phys. <u>46</u> , 1804 (1967).<br>5. W. F. Giaque, E. W. Hornung, R. A. Fisher, and<br>G. E. Brodale, J. Chem. Phys. <u>47</u> , 2685 (1967). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\alpha$ -NiSO <sub>4</sub> ·6H <sub>2</sub> O<br>Nickel Sulfate Hexahydrate | Sol     | 4.006 cm dia<br>sphere                 | PURITY: (wt. ppm) 20 Cu, 5 Pb, 10 Fe, 10 Mn, 20 Co.<br>(mass spectrograph and neutron activation)<br>ORIENTATION: <i>c</i> , <i>a</i> , bisector <i>a, b</i> crystal axes.<br>PROPERTIES STUDIED: Magnetothermodymics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.4 to 4.2°K.<br><br>1. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>46</u> , 4945 (1967).<br>2. R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>and W. F. Giaque, J. Chem. Phys. <u>48</u> , 1769 (1968).<br>3. R. A. Fisher and E. W. Hornung, J. Chem. Phys. <u>48</u> ,<br>4284 (1968).<br>4. R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>W. F. Giaque, J. Chem. Phys. <u>49</u> , 4096 (1968).<br>5. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>51</u> , 1959 (1969). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CuSO <sub>4</sub> ·5H <sub>2</sub> O<br>Copper Sulfate Pentahydrate   | Sol     | 3.700 cm dia<br>sphere                 | PURITY: (wt. ppm) 20 Fe, 10 Ni and Co.<br>(emission spectroscopy and neutron activation)<br>ORIENTATION: $\alpha$ , $\beta$ , $\gamma$ magnetic axes.<br>PROPERTIES STUDIED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.02 to 4.2°K.<br><br>1. T. H. Geballe and W. F. Giaque, J. Am. Chem. Soc.<br><u>74</u> , 3513 (1952).<br>2. R. J. Anderson and W. F. Giaque, J. Chem. Phys.<br><u>46</u> , 2413 (1967).<br>3. W. F. Giaque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>48</u> , 3728 (1968).<br>4. W. F. Giaque, E. W. Hornung, G. E. Brodale, and<br>R. A. Fisher, J. Chem. Phys. <u>48</u> , 3906 (1968).<br>5. W. F. Giaque, G. E. Brodale, R. A. Fisher, and<br>E. W. Hornung, J. Chem. Phys. <u>49</u> , 1848 (1968).<br>6. W. F. Giaque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>53</u> , 3733 (1970).<br>7. R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>W. F. Giaque, J. Chem. Phys. <u>63</u> , 4817 (1975). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{CuK}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$<br>Copper Potassium Sulfate Hexahydrate | Sol     | 3.912 cm dia<br>sphere                 | PURITY: Prepared from 99.9998% Cu metal.<br>ORIENTATION: $\alpha$ , $\gamma$ magnetic axes; $b$ crystal axis.<br>PROPERTIES STUDIED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.01 to 4.2°K.<br><br>1. J. R. Lemley and W. F. Giauque, J. Chem. . . . 51,<br>4650 (1969).<br>2. W. F. Giauque, G. E. Brodale, E. W. Hornung, and<br>R. A. Fisher, J. Chem. Phys. 54, 273 (1971).<br>3. W. F. Giauque, R. A. Fisher, G. E. Brodale,<br>and E. W. Hornung, J. Chem. Phys. 54, 4908 (1971).<br>4. W. F. Giauque, G. E. Brodale, E. W. Hornung, and<br>R. A. Fisher, J. Chem. Phys. 55, 355 (1971).<br>5. W. F. Giauque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. 55, 2859 (1971). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\beta\text{-Gd}_2(\text{MoO}_4)_3$<br>Gadolinium Molybdate           | Gz      | 2.49 cm dia<br>sphere                  | PURITY: (wt. ppm) 10 Na, 40 Al, 30 Ca, 5 Sc, 2V,<br>2 Cr, 5 Mn, 100 Fe, 5 Co, 150 Ni, 5 Cu, 5 Zn,<br>1 Sr, 150 Y, 1 Zr, 5 Nb, 10 La, 70 Ce, 15 Pr,<br>5 Nd, 1 Sm, 70 Eu, 50 Tb, 2 Dy, 2 Ho, 5 Hf.<br>(emission spectroscopy and mass spectrograph)<br>ORIENTATION: $a$ , $b$ , $c^+$ crystal axes.<br>(polarized ferroelectric)<br>PROPERTIES MEASURED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.08 to 4.2°K.<br><br>1. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giauque, J. Chem. Phys. 56, 193 (1972).<br>2. E. W. Hornung, G. E. Brodale, R. A. Fisher, and<br>W. F. Giauque, J. Chem. Phys. 56, 5007 (1972).<br>3. G. E. Brodale, R. A. Fisher, E. W. Hornung, and<br>W. F. Giauque, J. Chem. Phys. 56, 6118 (1972).<br>4. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giauque, J. Chem. Phys. 59, 5796 (1973).<br>5. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giauque (To be published J. Chem. Phys.). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\beta$ - $\text{Tb}_2(\text{MoO}_4)_3$<br>Terbium Molybdate          | Cz      | 1.170 cm dia<br>sphere                 | PURITY: (wt. ppm) 2 Al, 5 Si, 5 K, 20 Ca, 5 Cr, 1 Mn,<br>20 Fe, 2 Co, 10 Ni, 5 Cu, 5 Zn, 2 Cd, 1 Sn,<br>1 Pb, 5 Nd, 10 Dy, 5 Ho, 1 W.<br>(emission spectroscopy)<br>ORIENTATION: $c^+$ crystal axis.<br>(polarized ferroelectric)<br>PROPERTIES MEASURED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.4 to 4.2°K.<br><br>1. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>63</u> , 1295 (1975). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Gd}_3\text{Ga}_5\text{O}_{12}$<br>Gadolinium Gallium Garnet    | Cz      | 2.44 cm dia<br>sphere                  | PURITY: (wt. ppm) 2 Mg, 5 Si, 6 Ca, 2 Cr, 5 Fe, 5 Cu,<br>30 Y, 10 Mo, 15 Eu, 10 Lu, 10 Hf, 2 Pb, 2 Bi.<br>(emission spectroscopy and mass spectrograph)<br>ORIENTATION: [100], [110], and [111] crystal axes.<br>PROPERTIES MEASURED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.5 to 4.2°K.<br><br>1. R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>W. F. Giaque, J. Chem. Phys. <u>59</u> , 4652 (1973).<br>2. E. W. Hornung, R. A. Fisher, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>61</u> , 282 (1974).<br>3. G. E. Brodale, E. W. Hornung, R. A. Fisher, and<br>W. F. Giaque, J. Chem. Phys. <u>62</u> , 4041 (1975). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Ce}_2\text{Mg}_3(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$<br>Cerous Magnesium Nitrate 24 Hydrate | Sol     | 4.023 cm dia<br>sphere                 | PURITY: (wt. ppm) 2 V, 2 Cr, 20 Fe, 3 Co, 40 Ni, 1 Cu,<br>25 Zn, 15 Y, 1 Nb, 15 La, 25 Pr, 5 Nd.<br>(mass spectrograph)<br>ORIENTATION: $a$ crystal axis.<br>PROPERTIES MEASURED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.0006°K to 4.2°K.<br><br>1. R. A. Fisher, Rev. Sci. Instrum. <u>43</u> , 386 (1972).<br>2. W. F. Giaque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>58</u> , 2621 (1973).<br>3. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giaque, J. Chem. Phys. <u>58</u> , 5584 (1973). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Ce}_2\text{Zn}_3(\text{NO}_3)_{12} \cdot 24\text{H}_2\text{O}$<br>Cerous Zinc Nitrate 24 Hydrate | Sol     | 4.004 cm dia<br>sphere                 | PURITY: (wt. ppm) 2 V, 2 Cr, 20 Fe, 3 Co, 40 Ni,<br>1 Cu, 25 Zn, 15 Y, 1 Nb, 15 La, 25 Pr, 5 Nd.<br>(mass spectrograph)<br>ORIENTATION: $\alpha$ crystal axis.<br>PROPERTIES MEASURED: Magnetothermodynamics.<br>FIELD RANGE: 0 to 90,000 G.<br>TEMPERATURE RANGE: 0.0008°K to 4.2°K.<br><br>1. R. A. Fisher, Rev. Sci. Instrum. <u>46</u> , 155 (1975).<br>2. W. F. Giauque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>61</u> , 3495 (1974).<br>3. R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giauque, J. Chem. Phys. <u>62</u> , 555 (1975). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Nd}(\text{C}_2\text{H}_5\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$<br>Neodymium Ethyl Sulfate 9 Hydrate | Sol     | 3.920 cm dia<br>sphere                 | Purity: (wt. ppm) 50 Na (emission spectroscopy)<br>Orientation: $\alpha$ and $c$ crystal axes<br>Properties measured: Magnetothermodynamics<br>Field range: 0 to 90,000 G<br>Temperature range: 0.01 to 4.2°K<br><br>R. A. Fisher, Rev. Sci. Instrum. <u>47</u> , 1086 (1976)<br>W. F. Giauque, R. A. Fisher, E. W. Hornung, and<br>G. E. Brodale, J. Chem. Phys. <u>64</u> , 3330 (1976)<br>R. A. Fisher, E. W. Hornung, G. E. Brodale, and<br>W. F. Giauque, J. Chem. Phys. <u>65</u> , 4724 (1976)<br>R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>W. F. Giauque, J. Chem. Phys. <u>66</u> , 2678 (1977)<br>R. A. Fisher, G. E. Brodale, E. W. Hornung, and<br>W. F. Giauque, J. Chem. Phys. <u>68</u> , 169 (1978) | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MgO                                                                   | M       | 10x10x20                               | Purity 99; orientations <001>, <110>, <111><br>Mechanical behavior at elevated temps.                                | +                                    |
| Mullite ( $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ )              | Cz      | 10x40 boule                            | Purity nominal<br>Mechanical behavior at elevated temps.                                                             | -                                    |

| 59                                                                                                                       |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Antimony                                                                                                                 | ---     | 3x3x10                                 | Study its electrochemical potential and<br>its pH and oxygen dependence                                              | -                                    |

| 60                                                                                          |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. R.F. Bunshah                                                                   |         |                                        |                                                                                                                      |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ti Polycrystalline                                                                          | VP      | 150 x 150x5                            | Total Impurity Content 60 ppm                                                                                        | -                                    |
| Be Polycrystalline                                                                          | VP      | " " "                                  | Total Impurity Content 30 ppm                                                                                        | -                                    |
| Ni Polycrystalline                                                                          | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| TiC Polycrystalline                                                                         | VP      | 150x150x.01                            | Not Analyzed                                                                                                         | -                                    |
| Al <sub>2</sub> O <sub>3</sub> Polycrystalline                                              | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| ZrC Polycrystalline                                                                         | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| HfC Polycrystalline                                                                         | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| HfN Polycrystalline                                                                         | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| TiN Polycrystalline                                                                         | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| NbC Polycrystalline                                                                         | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| Y <sub>2</sub> O <sub>3</sub> Polycrystalline                                               | VP      | " " "                                  | Not Analyzed                                                                                                         | -                                    |
| Ni-20Cr Polycrystalline                                                                     | VP      | 150x150x5                              | Not Analyzed                                                                                                         | -                                    |

| 61                                                                                             |         |                                        |                                                                                                                             |                                      |
|------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Prof. L. G. DeShazer                                                                  |         |                                        |                                                                                                                             |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.        | Material<br>Avail-<br>ability<br>+ - |
| YAG                                                                                            | Cz      | 5x5x30                                 | Optical and thermal properties, Nd dopant                                                                                   | -                                    |
| YVO <sub>4</sub>                                                                               | Cz      | 5x5x20                                 | Optical properties, rare-earth dopants<br>J. Appl. Phys. <u>47</u> , 232 (1976)                                             | +                                    |
| La <sub>2</sub> Be <sub>2</sub> O <sub>5</sub>                                                 | Cz      | 10x10x10                               | Optical and thermal properties, Nd dopant                                                                                   | -                                    |
| YAlO <sub>3</sub>                                                                              | Cz      | 5x5x50                                 | Optical and thermal properties, rare-earth<br>dopants, laser applications<br>IEEE J. Quan. Elect. <u>QE-11</u> , 874 (1975) | +                                    |
| Ca <sub>5</sub> F(PO <sub>4</sub> ) <sub>3</sub>                                               | Cz      | 5x5x50                                 | Optical and thermal properties, laser<br>applications                                                                       | +                                    |
| Y <sub>2</sub> O <sub>3</sub>                                                                  | Ver     | 5x5x10                                 | Optical properties, laser applications                                                                                      | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                        | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GaI                                                                   | VP      | 20 x 10 x 2                            | (0120) single crystals on sapphire,<br>4 x 10 <sup>18</sup> cm <sup>-3</sup> native shallow donor,<br>mobility ~120 cm <sup>2</sup> /V-sec. |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)          | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdTe, cadmium telluride                                               | EC      | amorphous<br>or poly-<br>crystall-<br>ine films | Pure and doped with In (n-type) or As<br>(p-type).<br>R. M. Panicker, M. Knaster and F. A.<br>Krüger, J. Electrochem. Soc. <u>125</u> [4] 566<br>(1978). |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*            | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|--------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NbSe <sub>3</sub>                                                     | Direct<br>reaction | 8 x 1 x 0.05                           | Single crystals grow with longest dimension along<br>b-axis and shortest along a*. Linear chain crystal<br>structure <sup>1</sup> with conductivity anisotropy <sup>2</sup> of ~ 20.<br>Metallic behavior at all temperatures with RRR between<br>80 and 180. Two phase transitions <sup>3</sup> at T <sub>1</sub> (142 K) and<br>T <sub>2</sub> (58 K). Strong non-Ohmic behavior below T <sub>1</sub> and T <sub>2</sub><br>suggests sliding conductivity from charge-density-wave<br>condensate. Hall <sup>5</sup> , magnetoresistance <sup>2</sup> , Shubnikov-de-<br>Haas <sup>6</sup> , thermopower <sup>7</sup> , Young's modulus <sup>8</sup> and microwave <sup>4</sup><br>studies have been made. Superconducting under pressure<br>(T <sub>c</sub> ~ 2 K at 10 kbar) <sup>9</sup> .<br>1. A. Meerschaut and J. Rouxel, J. Less Common Metals<br>39, 197 (1975).<br>2. N. P. Ong and J. W. Brill, Phys. Rev. B (to appear)<br>3. J. Chaussy et al., Solid State Commun. <u>20</u> , 759<br>(1976).<br>4. N. P. Ong and P. Monceau, Phys. Rev. B <u>16</u> , 3443<br>(1977).<br>5. N. P. Ong and P. Monceau, Solid State Commun. <u>26</u> ,<br>487 (1978).<br>6. P. Monceau, Solid State Commun. <u>24</u> , 331 (1977).<br>7. J. Kwak, R. Greene, P. Chaikin and N. P. Ong,<br>unpublished.<br>8. J. W. Brill and N. P. Ong, Solid State Commun. <u>25</u> ,<br>1075 (1978).<br>9. P. Monceau, J. Peyrard, J. Richard and P. Molinie,<br>Phys. Rev. Lett. <u>39</u> , 160 (1977). |                                      |

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|--------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ice                                                                                                                | N       | Few                                    | For study of anisotropic growth kinetics and<br>morphological stability.                                             | --                                   |
| Oxides and oxide-metal<br>composites                                                                               | M       | 30X 30X<br>100                         | To check modeling of internal centrifugal zone<br>growth.                                                            | --                                   |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Name(s): CERES Corporation                                            |         |                                        |                                                                                                                                                                      |                                           |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                 | Material<br>Avail-<br>ability<br>+ -      |
| Cubic-Zirconia ( $ZrO_2$ ) crystals<br>( $Y_2O_3$ - stabilized)       | M       | 25x25x80                               | <ul style="list-style-type: none"> <li>99.99% pure</li> <li>Random orientation</li> <li>Undoped or doped with various rare earth or<br/>transition metals</li> </ul> | Research<br>&<br>Production<br>Quantities |

| 67                                                                                                            |         |                                        |                                                                                                                                                                                                                 |                                      |
|---------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                            | Material<br>Avail-<br>ability<br>+ - |
| $MgSiO_3$ Orthoenstatite                                                                                      | flu     | 13 x 6 x 3                             | Pure orthorhombic form obtained by multiple cooling.<br>Am. Conf. on Crystal Growth IV, July 1978.                                                                                                              | -                                    |
| $MgSiO_3$ Orthoenstatite                                                                                      | flu     | 5 x 1.5 x 1.5                          | Pure or doped with Ca, Ni, Mn, Cd, Cu, Zn, Cr, up to<br>20%. Mixed doping or higher concentration on request.<br>Can. Mineral 15, 321-338, (1977)<br>Geophysical Research Letter 2, No. 12, 533-536,<br>(1975). | +                                    |
| $Li_{x-x}Sc_{x-x}Mg_{2-2x}Si_2O_6$ Protoenstatite                                                             | flu     | 9 x 3 x 3                              | Stabilized Li/Sc Protopyroxene<br>Am. Mineral 62, 1252-1257, (1977).                                                                                                                                            | +                                    |
| $MgSiO_3$ Enstatite IV                                                                                        | flu     | 1.5 x .5 x .3                          | New protopyroxene of higher temp. stabilized Li/Sc<br>Proc. Japan Acad. 53, Ser. B, 60-63 (1977)                                                                                                                | -                                    |
| $LiScSiO_4$ Lithium Scandium Olivine                                                                          | flu     | 2 x 1 x 1                              | Am. Mineral 62, 356-361, (1977)                                                                                                                                                                                 | -                                    |
| $CaMgSi_2O_6$ Diopside                                                                                        | flu     | 4 x 3 x 3                              | Pure end member or slightly Mg rich Diopside<br>$VO^{++}$ impurity < 0.05 wt% $V_2O_5$                                                                                                                          | +                                    |
| *Jun Ito is now deceased - Crystal growth discontinued.<br>**O. J. Kleppa is in charge of crystal collection. |         |                                        |                                                                                                                                                                                                                 |                                      |

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 Telephone: (315) 268-6648  
 (315) 268-2302

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Low-melting glasses such as sodium borate                             | M       | 5-25 DIA                               | Will study surface-tension driven flows, bubble migration, and bubble centering in microgravity environment aboard space shuttle flights. Also will study similar phenomena in ground-based laboratory. | -                                    |

**69**  
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Camphor, camphene, succinonitrile, CBr <sub>4</sub> , naphthalene     | Z, Br   | 10x100                                 | Used for studies of particle rejection and of bubble generation during solidification. Reported in J. Crystal Growth, Separation Science & Technology, and Proceedings of the 15th Aerospace Sciences Meeting (1978). | -                                    |

**70**  
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 Telephone: (803) 656-3417

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                          | METHOD*                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tin, Indium, Bismuth, Lead, Aluminum and various alloys of these metals, all in "whisker" form | Growth<br>From the<br>solid<br>state | 0.002x0.002<br>x 10                    | All of these are from source materials at least 99.999%. Tin is available isotopically pure.                         |                                      |

**71**  
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 Telephone: (216) 486-6100

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdS Cadmium Sulfide                                                   | sub     | 30x30x25                               | 5-9's pure, as grown or S-compensated, doped on special order.                                                         | stocked                              |
| CdSe Cadmium Selenide                                                 | sub     | 40x30x25                               | 5-9's pure, as grown or Se-compensated, doped on special order.                                                        | stocked                              |
| CdTe Cadmium Telluride                                                | sub     | (15) <sup>3</sup>                      | 5-9's pure, as grown, also polycrystalline                                                                             | stocked                              |
| ZnSe Zinc Selenide                                                    | sub     | 5x5x10                                 | 5-9's pure, as grown                                                                                                   |                                      |
| ZnTe Zinc Telluride                                                   | sub     | (15)                                   | 5-9's pure, as grown, any orientation available; cubic materials may have (111) twin planes parallel to major surface. | stocked                              |
| BaTiO <sub>3</sub>                                                    | Flu     | 1x1x0.5                                | size, thickness and freedom from flaws vary from piece to piece. Ferroelectric, Inquiries welcomed                     | limited supply                       |

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Name(s): Allan Carlson, Lee Shiozawa

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Telephone: (216) 486-6100

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{KH}_2\text{PO}_4$ , KDP                                        | sol     | (100) <sup>3</sup>                     | > 99.8% pure, all orientations, piezoelectric, and electro-optic, SHG; available doped with $\text{Cr}^{3+}$ & $\text{Na}^+$                                 | stocked                              |
| $\text{KD}_2\text{PO}_4$ , KD*P                                       | sol     | (100) <sup>3</sup>                     | > 99.8% pure, all orientations, electro-optic, piezoelectric, SHG stocked in 99%, 90% grades, other levels on special order                                  | stocked                              |
| $\text{NH}_4\text{H}_2\text{PO}_4$ , ADP                              | sol     | (75) <sup>3</sup>                      | > 99% pure, all orientations, Electro-optic, piezoelectric, SHG, available doped with $\text{Cr}^{3+}$                                                       | stocked                              |
| $\text{NH}_4\text{H}_2\text{AsO}_4$ , ADA                             | sol     | (25) <sup>3</sup>                      | > 99% pure, all orientations, electro-optic, piezoelectric, SHG                                                                                              | stocked                              |
| $\text{KH}_2\text{AsO}_4$ , KDA                                       | sol     | 25x10x10                               | > 99% pure, electro-optic, piezoelectric, SHG<br>W.R. Cook Jr., J. Appl. Physics, <b>38</b> , 1637-42 (1967)<br>J. Inorg Nucl. Chem <b>25</b> , 844-7 (1967) | stocked                              |
| $\text{KB}_5\text{O}_8 \cdot 4\text{H}_2\text{O}$ , KBS               | sol     | (25) <sup>3</sup>                      | > 99% pure, all orientations, SHG, piezoelectric.<br>C.F. Dewey Jr., W.R. Cook Jr., R.T. Hodgson & J.J. Wynne<br>Appl. Phys. Lett. <b>26</b> 714-16 (1975)   | stocked                              |
| Triglycine Sulfate, TGS                                               | sol     | (25) <sup>3</sup>                      | > 99% pure, ferroelectric, pyroelectric                                                                                                                      | stocked                              |
| $\text{LiIO}_3$                                                       | sol     | (20) <sup>3</sup>                      | > 98% pure, SHG, pyroelectric, piezoelectric                                                                                                                 | stocked                              |
| + many other noncentrosymmetric crystals                              | sol     | variable                               | purity & orientations available, & quantities are limited We invite inquiries                                                                                | stocked                              |
| $\text{NaClO}_3$                                                      | sol     | 25x25x3                                | > 99.5% pure, (100) orientation, piezoelectric                                                                                                               | limited stock                        |
| $\text{NaNO}_3$                                                       | sol     | 15x15x2                                | > 99% pure, rhombohedron surface, calcite substitute                                                                                                         | stocked                              |
| $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$                     | sol     | (25) <sup>3</sup>                      | > 99% pure, all orientations, pyroelectric, piezoelectric                                                                                                    | limited stock                        |
| $\text{K}_2$ Tartrate $\cdot \frac{1}{2}\text{H}_2\text{O}$           | sol     | (25) <sup>3</sup>                      | > 98% pure, all orientations, piezoelectric                                                                                                                  | stocked                              |
| Rochelle salt                                                         | sol     | (25) <sup>3</sup>                      | > 98% pure, all orientations, piezoelectric, ferroelectric                                                                                                   | limited stock                        |

73

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Lithium                                                               |         |                                        | The compatibility of ferrous alloy for the containment of liquid lithium is being established. Weight loss and grain boundary penetration kinetics of ferrous alloys as a function of temperature, stress and lithium purity is being determined. Role of interstitial contaminants on the corrosion behavior and the effective use of gettering materials is being studied. Lithium metal extraction techniques are also being investigated. |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                             | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $(C_5H_5NH)Ag_5I_6$ : Pyridinium hexaiodo-<br>pentaargentate          | <u>Gel</u><br><u>Sol</u><br>(Poly)  | 1 x 1 x 5                              | Solid electrolyte: Crystal structure, silver ion site distribution, conductivity, phase transitions between $-30^\circ$ and $125^\circ C$ . S. Geller, Science <u>17b</u> , 1016 (1972), S. Geller and B. B. Owens, J. Phys. Chem. Solids <u>33</u> , 1241 (1972); phase transitions below $-30^\circ C$ , T. Hibma and S. Geller, J. Solid State Chem. <u>20</u> , 209 (1977) (also T. Hibma, Phys. Rev. <u>B15</u> , 5797 (1977)). | -                                    |
| $(C_5H_5NH)_5Ag_{18}I_{23}$ : Pentapyridinium<br>18-silver iodide     | <u>Gel</u><br>(Poly)                | 1 x 1 x 5                              | Solid electrolyte: Crystal structure and conductivity, S. Geller and P. M. Skarstad, Phys. Rev. Letters, <u>1484</u> (1974); S. Geller, P. M. Skarstad and S. A. Wilber, J. Electrochem. Soc. <u>122</u> , 332 (1975).                                                                                                                                                                                                               | -                                    |
| $RbAg_4I_5$ : Rubidium silver iodide                                  | <u>M</u>                            |                                        | Solid electrolyte: Crystal structures of $\beta$ - and $\gamma$ - $RbAg_4I_5$ , S. Geller, Phys. Rev. <u>B14</u> , 4345 (1976).                                                                                                                                                                                                                                                                                                      | -                                    |
| $Ag_{26}^{18}W_4O_{16}$ : 26-Silver 18-iodide<br>tetratingstate       | <u>M</u><br>(Poly)<br><br><u>Cz</u> | <br><br><br>7 x 4 x 110                | Solid electrolyte: Crystal structure and conductivity, L. Y. Y. Chan and S. Geller, J. Solid State Chem. <u>21</u> , 331 (1977).<br>[110], [010], [001], [100] Large crystals now being grown.                                                                                                                                                                                                                                       | -                                    |
| $(C_5H_5NH)_2Cu_5Br_7$ : Dipyridinium<br>heptabromopentacuprate       | <u>Br</u>                           | 6 diam<br>20 long                      | Solid electrolyte: Crystal structure, L. Y. Y. Chan, S. Geller and P. M. Skarstad, J. Solid State Chem. <u>25</u> , 85 (1978). For growth see P. M. Skarstad and H. S. Parker, J. Crystal Growth, in press.                                                                                                                                                                                                                          | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $Ag_8W_4O_{16}$ : Silver tetratingstate<br>(High temperature phase)                                                  | <u>Cz</u>  | 13 diam<br>40 long                     | $\sim[110]$ , Crystal structure, polarization, P. M. Skarstad and S. Geller, Mat. Res. Bull. <u>10</u> , 79 (1975); high temperature Raman spectroscopy, A. Turković et al., Mat. Res. Bull. <u>12</u> , 189 (1977). | -                                    |
| $(C_4N_2H_{12})Ag_{10}I_{12} \cdot 4C_3H_7NO$ : Piperazinium<br>10-silver 12-iodide $\cdot$ 4-dimethyl-<br>formamide | <u>Sol</u> | 0.1 x 0.1 x 10                         | [001], conductivity, crystal structure; S. Geller, L. Y. Y. Chan and G. F. Ruse, Mat. Res. Bull. <u>13</u> , 339 (1978). (See also June 1978 issue)                                                                  | -                                    |
| $SrAg_2I_4 \cdot 8H_2O$ , Strontium Tetraiodo-<br>diargentate Octahydrate                                            | <u>Sol</u> | 2 x 2 x 15                             | [001], Crystal structure, S. Geller and T. O. Dudley, J. Solid State Chem. to appear <u>26</u> , #3 (Nov. 1978).                                                                                                     | -                                    |
| $RGaO_3$ , $R \equiv Sm$ to $Er$<br>Perovskite-like rare earth gallium<br>oxides                                     | <u>M</u>   |                                        | Prepared at $1650^\circ - 2000^\circ C$ . Lattice constants determined, S. Geller, P. J. Curlander and G. F. Ruse, Mat. Res. Bull. <u>9</u> , 637 (1974).                                                            | -                                    |
| $YGaO_3$ : High temperature modification<br>of yttrium gallium oxide. Also<br>isostructural $HoGaO_3$ and $ErGaO_3$  | <u>M</u>   | 0.1 x 0.1 x 0.1                        | Crystal structure of hexagonal $YGaO_3$ quenched from $1950^\circ C$ , S. Geller, J. B. Jeffries and P. J. Curlander, Acta Cryst. <u>B31</u> , 2770 (1975).                                                          | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NdGaO <sub>3</sub> : Neodymium gallium oxide                          | Cz      | 8 diam<br>35 long                      | [100], [010], ultimately for substrate use;<br>G. F. Ruse and S. Geller, J. Cryst. Growth, <u>29</u> ,<br>305 (1975).                                                                                                                                                                                                                                                                                          | -                                    |
| YIG(Si): Yttrium iron garnet doped<br>with silicon                    | Flu     | largest<br>~ 10 mm                     | 0.12 Si <sup>4+</sup> per formula unit: magnetic circular<br>dichroism determination of effects of O <sub>2</sub> and N <sub>2</sub><br>annealing; B. Antonini, et al. Appl. Phys. Lett.<br><u>22</u> , 700 (1975); 0.12 Si <sup>4+</sup> - 0.3 Si <sup>4+</sup> per formula<br>unit: Saturation of Fe <sup>2+</sup> ion concentration,<br>P. Paroli and S. Geller, J. Appl. Phys. <u>48</u> , 1364<br>(1977). | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                            | METHOD*             | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Apatites: Ca <sub>10</sub> (PO <sub>4</sub> ) <sub>6</sub> (OH) <sub>2</sub><br>Ca <sub>10</sub> (PO <sub>4</sub> ) <sub>6</sub> Cl <sub>2</sub> | Hyd<br>Hyd &<br>Flu | 2 x 2 x 5<br>3 x 3 x 8                 | High purity and stoichiometry; defect structures<br>by ESR                                                           |                                      |
| Hydroxyphosphates and arsenates:<br>M <sub>2</sub> <sup>2+</sup> (PO <sub>4</sub> ) <sub>X</sub> , X = OH, F, Cl                                 | Hyd &<br>Flu        | 1 x 1 x 1                              | Single crystal structural studies (XRD)                                                                              |                                      |
| M <sub>5</sub> <sup>2+</sup> (PO <sub>4</sub> ) <sub>2</sub> (OH) <sub>4</sub> and other<br>stoichiometries                                      | Hyd                 | 1 x 1 x 1                              | " " " "                                                                                                              |                                      |
| SiO <sub>2</sub> ( <sup>17</sup> O enriched)                                                                                                     | Hyd                 | 2 x 2 x 3                              |                                                                                                                      |                                      |
| GeO <sub>2</sub> (pure and doped)                                                                                                                | Hyd &<br>Flu        | 2 x 2 x 3                              | ESR studies of radiation-induced defects                                                                             |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ba <sub>3</sub> Pt <sub>2</sub> O <sub>7</sub>                                                          | Flu     | .5x.5x1.0                              | STRUCTURE, MAGNETIC, THERMAL PROPS, CONDUCTIVITY<br>J. Solid State Chem., <u>21</u> , 217 (1977)                     | -                                    |
| BaIrO <sub>3</sub>                                                                                      | Flu     | .5x.5x2.0                              | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>(to be published)                                                               | +                                    |
| CrO <sub>2</sub>                                                                                        | H.P.    | .5x.5x2.0                              | STRUCTURE, MAGNETIC, CONDUCTIVITY, STABILITY<br>Mater. Res. Bull., <u>2</u> , 827 (1967)                             | +                                    |
| VO <sub>2</sub> (H.P.)                                                                                  | H.P.    | .5x.5x2.0                              | STRUCTURE, MAGNETIC, CONDUCTIVITY (TRANSITION TEMP.)<br>J. Solid State Chem., <u>7</u> , 377 (1973)                  | +                                    |
| SrRh <sub>2</sub> O <sub>4</sub>                                                                        | Flu     | .01x.5x.5                              | STRUCTURE (to be published)                                                                                          | -                                    |
| LiVO <sub>2</sub> (H.P.)                                                                                | H.P.    | .5x.5x.5                               | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>(to be published)                                                               | -                                    |
| BaCrO <sub>3</sub> (several polytypes)                                                                  | H.P.    | 1 x 1 x 2                              | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>Inorg. Chem., <u>8</u> , 236 (1969)                                             | +                                    |
| NiCrO <sub>3</sub>                                                                                      | H.P.    | .5x.5x1                                | STRUCTURE, MAGNETIC<br>J. Appl. Phys., <u>40</u> , 434 (1969)                                                        | +                                    |
| SrCrO <sub>3</sub>                                                                                      | H.P.    | .5x.5x1                                | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>Solid State Commun., <u>5</u> , 663 (1967)                                      | +                                    |
| CaCrO <sub>3</sub>                                                                                      | H.P.    | .5x.5x.5                               | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>J. Solid State Chem., <u>3</u> , 529 (1971)                                     | -                                    |
| SrVO <sub>3</sub>                                                                                       | H.P.    | .5x.5x1                                | STRUCTURE, MAGNETIC, CONDUCTIVITY<br>J. Solid State Chem., <u>3</u> , 243 (1971)                                     | -                                    |
| Ba <sub>3</sub> Re <sub>2-x</sub> O <sub>9</sub><br>H.P. = high pressure-high temperature grain growth. | H.P.    | .5x.5x1                                | STRUCTURE, MAGNETIC, IR<br>Inorg. Chem., <u>17</u> , 699 (1978)                                                      | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ni-Al-Ta                                                              | M       | 5 dia x<br>200 long                    | Dendritic monocrystals. Study of the<br>interaction between composition of the alloy,<br>microsegregation and dendritic coarsening<br>(Ostwald Ripening) during growth. |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tungsten single crystals                                              | Z                 | 1/16" - 1/2"<br>Diam.<br>8" long       | 99.999% purity or better oriented $\pm 2^\circ$                                                                      | +                                    |
| Nb, V, Ta, Ti, Mo, Re                                                 | Z                 | Up to 1/2"<br>Diam.<br>8" long         | 99.999% purity - oriented $\pm 2^\circ$                                                                              | +                                    |
| Ni, Pt, Pd, Ir                                                        | Z                 | 3/8" Diam.<br>x 3" long                | 99.999% purity                                                                                                       | +                                    |
| Cu, Zn, Ag, Au, Al                                                    | M, Br             | 1" Diam. x<br>4" long                  | 99.999% purity                                                                                                       | +                                    |
| In, Sn                                                                | M, Br             | 1" Diam. x<br>4" long                  | 99.999% purity                                                                                                       |                                      |
| Bicrystals of Nb, V, Ta, W, Mo & Re                                   | Z + EB<br>welding | 1/8 x 1/2 x<br>1-1/2                   | 99.999% purity                                                                                                       |                                      |
| Alloy metal Crystals Grown, Arc cast<br>and Zone Refined -            | Z                 | 1/4 x 3"                               |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CaF <sub>2</sub> - Calcium Fluoride                                   | Cz      | 25x25x80                               | All Starting Materials are highest<br>purity available.                                                                                         |                                      |
| CsBr - Cesium Bromide                                                 | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| CsCl - Cesium Chloride                                                | Cz      | 20x20x80                               | Most of these crystals are grown in the<br>100, 110 or 111 direction and can be<br>doped with a wide variety and concentration<br>of materials. |                                      |
| CsF - Cesium Fluoride                                                 | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| CsI - Cesium Iodide                                                   | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| KBr - Potassium Bromide                                               | Cz      | 30x30x100                              |                                                                                                                                                 |                                      |
| KCl - Potassium Chloride                                              | Cz      | 30x30x100                              |                                                                                                                                                 |                                      |
| KF - Potassium Fluoride                                               | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| LiBr - Lithium Bromide                                                | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| LiCl - Lithium Chloride                                               | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| LiF - Lithium Fluoride                                                | Cz      | 30x30x100                              |                                                                                                                                                 |                                      |
| MgF <sub>2</sub> - Magnesium Fluoride                                 | Cz      | 25x25x80                               |                                                                                                                                                 |                                      |
| MnF <sub>2</sub> - Manganese Fluoride                                 | Cz      | 20x20x60                               |                                                                                                                                                 |                                      |
| NaBr - Sodium Bromide                                                 | Cz      | 25x25x80                               |                                                                                                                                                 |                                      |
| NaCl - Sodium Chloride                                                | Cz      | 30x30x100                              |                                                                                                                                                 |                                      |
| NaF - Sodium Fluoride                                                 | Cz      | 30x30x80                               |                                                                                                                                                 |                                      |
| NaI - Sodium Iodide                                                   | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| RbBr - Rubidium Bromide                                               | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| RbCl - Rubidium Chloride                                              | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| RbI - Rubidium Iodide                                                 | Cz      | 20x20x80                               |                                                                                                                                                 |                                      |
| KCoF <sub>3</sub> - Potassium Cobalt Fluor.                           | Cz      | 20x20x50                               |                                                                                                                                                 |                                      |
| KMnF <sub>3</sub> - Potassium Manganese Fl.                           | Cz      | 20x20x50                               |                                                                                                                                                 |                                      |
| RbCoF <sub>3</sub> - Rubidium Cobalt Fluoride                         | Cz      | 15x15x50                               |                                                                                                                                                 |                                      |
| RbMnF <sub>3</sub> - Rubidium Manganese Fluo.                         | Cz      | 20x20x75                               |                                                                                                                                                 |                                      |

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Name(s): Crystal Optics Research, Inc.  
 Inst. & Address: P.O. Box 2756, Escondido, CA. 92025 Telephone: 714-741-7080

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Aluminum Oxide                                                        | CZ      | 35 mm dia.<br>40 cm lg.                | Purity: 99.99% Orientation: 0°, 60°, 90°<br>Dopant: Cr                                                               | stock                                |
| Yttrium Aluminum Garnet                                               | CZ      | 30 mm dia.<br>40 cm. lg.               | Purity: 99.95% Orientation: (100), (111)<br>Dopants: Cr, Nd                                                          | stock                                |

| <b>83</b><br>Name(s): Frederick Schmid and Chandra P. Khattak<br>Inst. & Address: Crystal Systems, Inc., Shetland Industrial Park<br>35 Congress St., Salem, MA 01970<br>(617)<br>Telephone: 745-0088 |            |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                 | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)    | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| Sapphire                                                                                                                                                                                              | M<br>(HEM) | 320 mm<br>diameter<br>x<br>130 mm<br>high | Method: Heat Exchanger Method (HEM) of<br>Casting by Directional Solidification<br>Purity: 99.999+%<br>Orientation: (10T0), (11Z0), (0001)<br>Characterization: No light scattering;<br>Transmission, Dislocation Density<br>Applications: Infrared, Optical<br>Publications: F. Schmid and D. Viechnicki,<br>J.Am.Ceram.Soc. 53, 528 (1970); F. Schmid<br>and D. Viechnicki, Solid State Technology<br>16, 45 (1973); D. Viechnicki and F. Schmid,<br>J.Crystal Growth 26, 162 (1974).                                                                                                                                                                 | Yes                                  |
| Silicon                                                                                                                                                                                               | M<br>(HEM) | 152 mm<br>diameter<br>x<br>70 mm high     | Method: Heat Exchanger Method (HEM) of<br>Casting by Directional Solidification<br>Purity: Semi-conductor grade<br>Orientation: (100) and (111)<br>Dopants: Boron<br>Properties: Crystallinity, dislocation<br>density, solar cell efficiency, minority<br>carrier lifetime, diffusion length<br>Application: Photovoltaic<br>Publications: C. P. Khattak and F. Schmid,<br>"Casting Large Silicon Crystals in Clear<br>Silica Crucibles," Am.Ceram.Soc.Bull. (in<br>press); C.P.Khattak and F. Schmid,<br>"Directional Solidification of Crack-free<br>Silicon Ingots by Heat Exchanger Method,<br>IEEE Photovoltaic Specialists Conf., Wash.DC (1978) | Yes                                  |

| <b>84</b><br>Name(s): Lawrence J. Castelli, Sales Manager<br>Crystal Technology, Incorporated<br>Inst. & Address: 2510 Old Middlefield Way<br>Mountain View, CA 94043<br>Telephone: (415) 961-9311<br>TWX: 910-379-6625 |         |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| LiNbO <sub>3</sub> , lithium niobate                                                                                                                                                                                    | Cz      | 75x75x300                              | for optical and acoustic applications                                                                                | stock                                |
| LiTaO <sub>3</sub> , lithium tantalate                                                                                                                                                                                  | Cz      | 35x35x 75                              | for optical and acoustic applications                                                                                | stock                                |
| TeO <sub>2</sub> , tellurium dioxide                                                                                                                                                                                    | Cz      | 50x50x 75                              | for acousto-optical applications                                                                                     | stock                                |
| Bi <sub>4</sub> Ge <sub>3</sub> O <sub>12</sub> , bismuth germanate                                                                                                                                                     | Cz      | 60x60x100                              | for X-ray scintillator applications                                                                                  | stock                                |
| Bi <sub>12</sub> GeO <sub>20</sub> , bismuth germanium oxide                                                                                                                                                            | Cz      | 30x30x250                              | for optical and acoustic applications                                                                                | stock                                |
| Bi <sub>12</sub> SiO <sub>20</sub> , bismuth silicon oxide                                                                                                                                                              | Cz      | 30x30x250                              | for optical and acoustic applications                                                                                | stock                                |
| SiO <sub>2</sub> , quartz                                                                                                                                                                                               | Sol     | -                                      | for acoustic applications                                                                                            | stock                                |

| <b>85</b><br>Name(s): W.H. Robinson<br>Inst. & Address: Crystecco, Inc. 180 East Main Street, Wilmington, OH 45177<br>Telephone: 513-382-5555 |         |                                        |                                                                                                                                              |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                         | Material<br>Avail-<br>ability<br>+ - |
| Silicon                                                                                                                                       | Cz      | 100 mm dia x<br>1000 mm long           | Semiconductor grade; 6PPba (up to 40 ohm-cm<br>P-type or 12 ohm-cm N-type); zero dislocation<br>density; 1-1-1, 1-0-0 and 1-1-0 orientations | +                                    |

86

Name(s): H. Windawi

Inst. & Address: Center for Catalytic Science and Technology, Univ. of Del.  
Newark, Delaware 19711

Telephone: (302) 738-2543

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Zirconia-supported nickel<br><br>Ni/ZrO <sub>2</sub>                  | SOL     | 3 X 3 X 5                              | 2 to 5% Ni, ZrO <sub>2</sub> remainder. Generally pellets of irregular shapes are produced and are used as a methanation catalyst. Characterization by AES, ESCA, SEM, EDS, Laser Raman, EXAFS and X-ray diffraction. UHP materials used. | -                                    |

87

Name(s): ROBERT G. HUNSPERGER

Inst. & Address: DEPARTMENT OF ELECTRICAL ENGINEERING  
UNIVERSITY OF DELAWARE, NEWARK, DELAWARE 19711

Telephone: (302) 738-2405

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ga <sub>(1-x)</sub> Al <sub>x</sub> As<br>Gallium Aluminum Arsenide   | LE        | 10x10x0.1                              | Growth of multilayer structures using slide-bar technique on (100) GaAs substrates - applications, opto-electronic devices and optical integrated circuits (OIC's) |                                      |
| Zn <sub>3</sub> P <sub>2</sub><br>Zinc Phosphide                      | MBE<br>VP | 10x10x0.1                              | Growth of thin films - applications, solar cells and optoelectronic devices                                                                                        |                                      |

88

Name(s): J. D. Meakin

Inst. & Address: Institute of Energy Conversion, University of Delaware,  
One Pike Creek Center, Wilmington, DE 19808

Telephone: 302-995-7155

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Zinc phosphide, Zn <sub>3</sub> P <sub>2</sub>                        | VP      | 8 x 8 x 20                             | 99.9995 + %. Random orientation. Optical absorption, electronic properties. Photovoltaic absorber.                   |                                      |
| CdS                                                                   | Sub.    | 60 cm <sup>2</sup> x<br>.03 mm thick   | evaporated films with preferred c-axis orientation $\perp$ to substrate; $0.1 < \rho < 100 \Omega\text{-cm}$ .       |                                      |
| Zn <sub>x</sub> Cd <sub>1-x</sub> S<br>(0 $\leq x \leq 0.4$ )         | Sub.    | 60 cm <sup>2</sup> x<br>.03 mm thick   | evaporated films with preferred c-axis orientation $\perp$ to substrate; $0.1 < \rho < 10^4 \Omega\text{-cm}$ .      |                                      |

89

Name(s): Dr. Leon D. Crossman, Dr. Jim McCormick

Inst. & Address: Dow Corning Corporation, 12334 Geddes Rd., Hemlock,  
Michigan 48626

Telephone: (517)642-5201

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Silicon (Si)                                                          | CVD     | 200 mm x<br>1000 mm                    | Polycrystalline Silicon for Electronics<br>Industry                                                                  | +                                    |
|                                                                       | CZ      | 125 mm x<br>Dia.                       | Single Crystal Ingot and Wafers for<br>Electronics Industry                                                          | +                                    |
|                                                                       | FZ      | 100 mm x<br>Dia.                       | " "                                                                                                                  | "                                    |
|                                                                       | CVD     | 135 mm x<br>2150 mm                    | Polysilicon Diffusion Tubes                                                                                          | +                                    |

90

Name(s): Rex Trammell

Inst. & Address: EG&G ORTEC  
100 Midland Road, Oak Ridge, TN 37830 U.S.A.

Telephone: (615) 482-4411

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Germanium                                                             | Cz      | 50x50x200                              | Suitable for lithium compensated radiation<br>detectors.                                                             |                                      |
| Germanium                                                             | Cz      | 50x50x100                              | Impurity concentration <1 part in 10 <sup>12</sup> ,<br>suitable for high purity germanium<br>radiation detectors.   |                                      |

EM Laboratories, Inc.  
500 Executive Boulevard  
Elmsford, New York U.S.A. 10523  
Att: Electrooptics Division  
Phone 914/592-4660

associate of  
E. Merck, Darmstadt, Germany  
Postfach 4119  
D-6100 Darmstadt  
Phone 06151-721

# MATERIALS FOR ELECTRONIC AND OPTIC APPLICATIONS

Materials used to prepare synthetic single crystals for optical and electronic applications are subject to stringent purity requirements and E. Merck, Darmstadt, has drawn upon extensive experience in producing chemicals of extraordinary purity to assemble a program of materials specifically designed for this application. These chemicals are marketed under the tradename Optipur.<sup>R</sup>

EM's optical program features chemicals additionally designated as "FO", which are specially suited for the production of fiber optics. These substances rank among the purest materials commercially available; transition metal impurities which might affect fiber attenuation are analyzed and guaranteed in the range of several parts per billion. Materials designated Optipur HP, specially suited for hot pressing applications, are also available.

Other specially designed and applications tested materials are Patinal<sup>R</sup> chemicals for vacuum deposition and Suprapur<sup>R</sup> reagents of the highest purity.

Cited below is a partial listing of the many high purity chemicals available. Further information and brochures may be obtained from the local EM representative.

|                            |                                  |                             |
|----------------------------|----------------------------------|-----------------------------|
| Acids                      | Lithium compounds                | Sodium bromide              |
| Ammonium aluminum sulfate  | Magnesium fluoride               | Sodium carbonate            |
| Ammonium titanyl oxalate   | Manganese fluoride               | Sodium chloride             |
| Arsenic (III) Chloride     | Mercury                          | Sodium fluoride             |
| di-Arsenic trioxide        | Mercury compounds                | Sodium iodide               |
| Barium compounds           | Magnesium nitrate                | Sodium nitrate FO           |
| Bismuth oxide              | Niobium oxide                    | di-Sodium tetraborate       |
| Boric Acid                 | Phosphorous oxide trichloride FO | <b>Solvents</b>             |
| di-boron trioxide          | Phosphorous tribromide           | Strontium compounds         |
| Boron tribromide           | Phosphorous trichloride          | Tetraethyl orthosilicate FO |
| Cadmium selenide           | Potassium bromide                | Thallium bromide            |
| Cadmium sulfide            | Potassium carbonate FO           | Thallium chloride           |
| Calcium carbonate          | Potassium chloride               | Thallium iodide             |
| Calcium fluoride           | Potassium dihydrogen arsenate    | Titanium dioxide            |
| Cesium bromide             | Potassium fluoride               | Triglycine sulfate          |
| Cesium chloride            | Potassium iodide                 | Zinc selenide               |
| Cesium iodide              | Potassium nitrate FO             | Zinc sulfide                |
| Chromium                   | Potassium sodium tartrate        | Zirconium dioxide           |
| Chromium compounds         | Rubidium compounds               |                             |
| Germanium tetrachloride FO | Silicon dioxide FO               |                             |
| Lead (II) Fluoride         | Silver chloride                  |                             |
| Lead (II) oxide FO         | Silver peroxide                  |                             |

92

Name(s): J. E. Powderly, Contracts Manager

Inst. & Address: Eagle-Picher Industries, Inc.  
P.O. Box 1090, Miami, OK 74354

Telephone: (918)542-1801

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.          | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdS Cadmium Sulfide                                                   | VP      | 30x30x30                               | 99.999% purity of synthesized II-VI powders.                                                                                  | +                                    |
| CdSe Cadmium Selenide                                                 | M       | 20x20x10                               | Orientation available for single crystals.                                                                                    | +                                    |
| ZnS Zinc Sulfide                                                      | Br      | 15x15x5                                | Almost any dopant usable in the melt/                                                                                         | +                                    |
| ZnSe Zinc Selenide                                                    | Sub     | 15x15x5                                | Bridgman crystals. Applications as wave plates,<br>substrates, IR windows, solar cells, etc.                                  | +                                    |
| CdO Cadmium Oxide                                                     |         | <2mm <sup>3</sup>                      |                                                                                                                               | +                                    |
| CdTe Cadmium Telluride                                                |         | 10x10x5                                |                                                                                                                               | +                                    |
| ZnO Zinc Oxide                                                        |         | <2mm <sup>3</sup>                      |                                                                                                                               | +                                    |
| ZnTe Zinc Telluride                                                   |         | <3mm <sup>3</sup>                      |                                                                                                                               | +                                    |
| B Boron                                                               | CZ      | 5mm dia x<br>30 mm l (poly)            | Purity to 99.999%; beta rhombohedral.<br>Rods and crystalline powder available.<br>Also isotopic Boron-10, Boron-11 products. | +                                    |
| InP Indium Phosphide                                                  |         |                                        |                                                                                                                               | -                                    |
| GaAs Gallium Arsenide                                                 | Br      |                                        | Research on improved methods of crystal growth.                                                                               | -                                    |

| 93                                                                                                                                              |                                                                                      |                                                                                              |                                                                                                                                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. Charles F. Pulvarl                                                                                                                 |                                                                                      |                                                                                              |                                                                                                                                                                                                                                      |                                      |
| Inst. & Address: Electrocrystal Corporation, Inc. - 2014 Taylor St., N.E.<br>Washington, D. C. 20018                                            |                                                                                      |                                                                                              | Telephone: 202/526-2400                                                                                                                                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                           | METHOD*                                                                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                                       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
| III-V Compounds<br>Oxides<br>Arsenides<br>Nitrates<br>Trinitrotoluene (TNT)<br>Pentacrythritol Tetranitrate<br>(PETN)<br>Niobates<br>Tantalates | Vapor<br>Melt<br>Melt<br>Water<br>Water<br>Water<br>Molten<br>Salt<br>Molten<br>Salt | Few lbs.<br>Few lbs.<br>Few lbs.<br>Few lbs.<br>Few lbs.<br>Few lbs.<br>Few lbs.<br>Few lbs. | The various types of crystals come in different dimensions some of which can be grown as requested. Some others, especially the high temperature types are usually smaller in size mainly because the small demand on such crystals. |                                      |

| 94                                                                                                                               |         |                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
|----------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): G. Perkowitz                                                                                                            |         |                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
| Inst. & Address: Physics Department, Emory University, Atlanta, Georgia 30322 U.S.A.                                             |         |                                                             | Telephone: (404) 329-6584                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                      | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
| The following materials are<br>studied (see comments)<br><br>GaAs, InAs, InGaAsP,<br>PbTe, PbSe, PbSnTe, PbSnSe,<br>HgTe, HgMnTe |         | Can deal<br>with sizes<br>from 3mm<br>dia. to<br>10 mm dia. | These semiconductors and semiconductor alloys are<br>studied in bulk and epitaxial form by far infrared<br>spectroscopy for basic information and as a<br>characterization method. We will consider making<br>such measurements on any interesting samples<br>loaned or given us by crystal growers and will<br>supply the results to the grower. All the listed<br>materials and any related ones are of potential<br>interest. We can determine lattice and free<br>carrier parameters, and on epitaxial samples can<br>probe the interface region. | Not<br>avail-<br>able.               |

| 95                                                                                    |         |                                             |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------|---------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Juergen F. Schroeter - E. C. Winkelmann                                      |         |                                             |                                                                                                                      |                                      |
| Inst. & Address: Engelhard Industries<br>700 Blair Road<br>Carteret, New Jersey 07008 |         |                                             | Telephone: (201) 321-5721                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)      | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| . Iridium and Platinum Crucibles                                                      | --      | 180 m/m OD<br>350 m/m High<br>3.5 m/m thick | Crystal growing quality with controlled impurity levels                                                              | 4 weeks                              |
| . Platinum, Palladium, Iridium, Rhodium Targets for sputtering                        |         | various                                     | Commercial purity and high purity, vacuum melted                                                                     | 6 weeks                              |
| . Platinum, Palladium, Iridium, Rhodium, strip, tape, foil or wire                    |         | various                                     | Commercial purity and high purity, vacuum melted and low oxygen content                                              | 2 weeks                              |
| . Platinum 5% Gold seed holders                                                       |         | custom fabricated                           | Commercial purity                                                                                                    | 4 weeks                              |

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Name(s): Lawrence B. Ebert  
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 P. O. Box 45  
 Linden, New Jersey 07036

Telephone: 201 - 474-3930

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $C_{8-10}AsF_5$                                                       | VLS     | 10 X 10 X 1                            | XRD(T), $^{19}F$ NMR (T) ESR (T),<br>Raman, susceptibility                                                           | -                                    |
| $C_{8.7}XeOF_4$ , $C_{19}XeF_6$ ,<br>$C_{13}UF_6$                     | VLS     | 0.1 X 0.1<br>X 0.005                   | XRD, $^{19}F$ NMR, ESR                                                                                               | -                                    |
| $C_{13}CrO_3$ , $C_{27}CrO_2Cl_2$                                     | VLS     | 0.1 X 0.1<br>X 0.005                   | XRD, ESR, susceptibility                                                                                             | -                                    |

97

Name(s): L.H. Peirce  
 Inst. & Address: Department of Physics  
 Florida State University, Tallahassee, Fla. 32306

Telephone: (904) 644-6496

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Rubidium Tungsten Bronze<br>$Rb_xWO_3$                                | VP      | 3X3X5                                  | Grown for superconductivity studies                                                                                  | -                                    |
| Cesium Tungsten Bronze<br>$Cs_xWO_3$                                  | VP      | 3X3X5                                  | Grown for Superconductivity studies                                                                                  | -                                    |

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Name(s): Prof. Stanley S. Ballard  
 Inst. & Address: Dept. of Physics, University of Florida, Gainesville, Fla. 32611

Telephone: 904/392-0487

| MATERIALS<br>(Formula & Technical or Common Name)                                                                                                                          | STUDIED | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                                                                                                           | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Optical Materials, especially the newer<br>ones of use in Infrared Instrumenta-<br>tion<br><br>(Samples are furnished by the manu-<br>facturers of the optical materials.) |         | DNA     | Solid<br>cylinders<br>13 mm long;<br>diameter<br>is not<br>critical<br>(6 mm is<br>suggested)                                                                    | Can determine coefficient of linear thermal expansion<br>in the temperature range 10 K to 500 K.                                                                                                                                                  | DNA                                  |
| " " "                                                                                                                                                                      |         | DNA     | Disk-shaped<br>samples with<br>plane-<br>parallel<br>faces. Max.<br>diameter 25<br>mm; max.<br>thickness<br>1.5 mm (much<br>thinner<br>samples are<br>preferred) | Can measure low-frequency dielectric constant in the<br>temperature range 300-500 K.<br><br>(Similar measurements, from 60 K to 300 K, are made<br>by Dr. J. S. Browder, Physics Dept., Jacksonville<br>University, Jacksonville, Florida 32211.) | DNA                                  |

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175 CURTNER AVENUE, SAN JOSE, CALIF. 95125

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{In}_x \text{Ga}_{1-x} \text{Sb}$<br>Indium Gallium Antimonide  | Br      | 100 mm<br>long<br>10 mm diam.          | <111> , Effects of Magnetic Field, Annealing, on<br>Grain and Twin boundaries.<br><br>(1) Crystal Growth, 43 (1978) 526<br><br>(2) Mat. Res. Bull. Vol. 13, 293, 1978<br><br>(3) Met. Trans. A, Vol. 9, 462, 1978 |                                      |

100

Name(s): Glen A. Slack and Tom F. McNelly

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| AlN, aluminum nitride                                                 | Sub.    | 10x3x3                                 | high purity, low oxygen content, undoped; thermal<br>conductivity, thermal expansion, optical properties             | -                                    |

101

Name(s): Wayne Lo

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Warren, MI 48090

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. Lead-Tin-Telluride<br>( $\text{Pb}_{1-x}\text{Sn}_x\text{Te}$ )    | Sub     | 10X10X10                               | 1) High purity (6'9 materials used)<br>2) Cubic structure, (100) orientation<br>3) No dopant. Carrier concentration and type<br>generated from stoichiometry adjustment<br>4) Semiconductor lasers<br>5) Publications:<br>a) W. Lo, G. P. Montgomery, Jr., D. E. Swets,<br>J. Appl. Phys. <u>47</u> , 267 (1976).<br>b) W. Lo, J. Electron Materl. <u>6</u> , 39 (1977) |                                      |
| 2. Lead-Sulfide-Selenide<br>( $\text{PbS}_{1-x}\text{Se}_x$ )         |         |                                        | Same as above                                                                                                                                                                                                                                                                                                                                                           |                                      |

| <b>102</b><br>Name(s): THE HARSHAW CHEMICAL CO.<br>Inst. & Address: Crystal & Electronic Products Dept.<br>6801 Cochran Rd., Solon, Ohio 44139<br>Telephone: 216-248-7400 |                                                                                                                                                      |                                               |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                     | METHOD*                                                                                                                                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)        | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| BaClF Barium Chloro Fluoride                                                                                                                                              | Performance specifications will determine growth method, dimensions, and purity. Harshaw growth capabilities include: M, Sol, Flu, VP, Cz, Br, & St. | Ingot size has not to date been a limitation. | Scintillator $\tau = .5\mu s$ , 385nm, 4.51g/cm <sup>3</sup>                                                         | +                                    |
| BaF <sub>2</sub> Barium Fluoride                                                                                                                                          |                                                                                                                                                      |                                               | Optics, transmits .135 to 15 $\mu m$                                                                                 | +                                    |
| Bi <sub>4</sub> Ge <sub>3</sub> O <sub>12</sub> BGO                                                                                                                       |                                                                                                                                                      |                                               | Epitaxial growth base                                                                                                |                                      |
| CdF <sub>2</sub> Cadmium Fluoride                                                                                                                                         |                                                                                                                                                      |                                               | Scintillator $\tau = .63\mu s$ , 325 & 625nm, 4.88g/cm <sup>3</sup>                                                  | +                                    |
| CaF <sub>2</sub> Calcium Fluoride                                                                                                                                         |                                                                                                                                                      |                                               | Scintillator $\tau = .30\mu s$ , 480nm, 7.13g/cm <sup>3</sup>                                                        | +                                    |
| CaF <sub>2</sub> Polytran <sup>R</sup> Calcium Fluoride                                                                                                                   |                                                                                                                                                      |                                               | Scintillator/Optic transmits .206 to 11 $\mu m$                                                                      | +                                    |
| CaF <sub>2</sub> (Eu) Europium doped Calcium Fluoride                                                                                                                     |                                                                                                                                                      |                                               | Optics, transmits .125 to 12 $\mu m$                                                                                 | +                                    |
| CsBr Cesium Bromide                                                                                                                                                       |                                                                                                                                                      |                                               | Optics, transmits .125 to 12 $\mu m$                                                                                 | +                                    |
| CsF Cesium Fluoride                                                                                                                                                       |                                                                                                                                                      |                                               | Polycrystalline forged optic                                                                                         |                                      |
| CsI Cesium Iodide                                                                                                                                                         |                                                                                                                                                      |                                               | Scintillator $\tau = 1.1\mu s$ , 435nm, 3.18g/cm <sup>3</sup>                                                        | +                                    |
| CsI Cesium Iodide powder                                                                                                                                                  |                                                                                                                                                      |                                               | Optics, transmits .210 to 50 $\mu m$                                                                                 | +                                    |
| CsI(Na) Sodium Doped Cesium Iodide                                                                                                                                        |                                                                                                                                                      |                                               | Scintillator $\tau = .005-.15\mu s$ , 335-390nm, 3.59g/cm <sup>3</sup>                                               | +                                    |
|                                                                                                                                                                           |                                                                                                                                                      |                                               | Optics, transmits .235 to 60 $\mu m$                                                                                 | +                                    |
|                                                                                                                                                                           |                                                                                                                                                      |                                               | IR pellets                                                                                                           | +                                    |
|                                                                                                                                                                           |                                                                                                                                                      |                                               | Scintillator $\tau = .65-1.0\mu s$ , 420nm, 4.51g/cm <sup>3</sup>                                                    | +                                    |

| <b>103</b><br>Name(s): The Harshaw Chemical Co.<br>Inst. & Address: Crystal & Electronic Products Dept.<br>6801 Cochran Rd., Solon, Ohio 44139<br>Telephone: 216-248-7400 |                                                                                                                                                      |                                               |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                     | METHOD*                                                                                                                                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)        | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| CsI(Tl) Thallium doped Cesium Iodide                                                                                                                                      | Performance specifications will determine growth method, dimensions, and purity. Harshaw growth capabilities include: M, Sol, Flu, VP, Cz, Br, & St. | Ingot size has not to date been a limitation. | Scintillator, $\tau = 1.1\mu s$ , 420-570nm, 4.51g/cm <sup>3</sup>                                                   | +                                    |
| PbF <sub>2</sub> Lead Fluoride - $\beta$                                                                                                                                  |                                                                                                                                                      |                                               | Optics, transmits .29 to 11.6 $\mu m$                                                                                | +                                    |
| LiF Lithium Fluoride                                                                                                                                                      |                                                                                                                                                      |                                               | Optics, transmits .11 to 7.0 $\mu m$ , X-ray                                                                         | +                                    |
| LiI(Eu) Europium doped Lithium Iodide                                                                                                                                     |                                                                                                                                                      |                                               | Diffraction plates                                                                                                   |                                      |
| <sup>6</sup> LiI(Eu) Europium doped Lithium Iodide                                                                                                                        |                                                                                                                                                      |                                               | Scintillator, $\tau = 1.4\mu s$ , 440nm, 4.06g/cm <sup>3</sup>                                                       | +                                    |
| <sup>7</sup> LiI(Eu) Europium doped Lithium Iodide                                                                                                                        |                                                                                                                                                      |                                               | Scintillator, $\tau = 1.4\mu s$ , 440nm, 4.06g/cm <sup>3</sup>                                                       | +                                    |
| LiNbO <sub>3</sub> Lithium Niobate                                                                                                                                        |                                                                                                                                                      |                                               | Scintillator, $\tau = 1.4\mu s$ , 440nm, 4.06g/cm <sup>3</sup>                                                       | +                                    |
| MgF <sub>2</sub> Magnesium Fluoride                                                                                                                                       |                                                                                                                                                      |                                               | Electro-optic                                                                                                        | +                                    |
| MgF <sub>2</sub> Hot pressed Magnesium Fluoride                                                                                                                           |                                                                                                                                                      |                                               | Optics, transmits .11 to 7.5 $\mu m$                                                                                 | +                                    |
| MgTiO <sub>3</sub> Magnesium Titanate                                                                                                                                     |                                                                                                                                                      |                                               | Ceramic IR optic, 2 to 7 $\mu m$                                                                                     | +                                    |
| KBr Potassium Bromide                                                                                                                                                     |                                                                                                                                                      |                                               | Microwave ceramic                                                                                                    | +                                    |
| KBr Potassium Bromide powder                                                                                                                                              |                                                                                                                                                      |                                               | Optics, transmits .205 to 25 $\mu m$                                                                                 | +                                    |
|                                                                                                                                                                           |                                                                                                                                                      |                                               | IR pellets                                                                                                           | +                                    |

| <b>104</b> The Harshaw Chemical Co.<br>Name(s):      Crystal & Electronic Products Dept.<br>6801 Cochran Rd., Solon, Ohio 44139<br>Inst. & Address:      Telephone: 216-248-7400 |                                                                                                                                                       |                                              |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                            | METHOD*                                                                                                                                               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| KBr      Potassium Bromide<br>Wickstick <sup>R</sup> Elements                                                                                                                    | Performance specifications will determine growth method, dimensions, and purity. Harshaw growth capabilities include: N, Sol, Flu, VP, Cz, Br and St. | Ingot size has not to date been a limitation | Wick separation and IR spectra                                                                                       | +                                    |
| KCl      Potassium Chloride                                                                                                                                                      |                                                                                                                                                       |                                              | Optics, transmits .180 to 20μm                                                                                       | +                                    |
| KCl      Polytran <sup>R</sup> Potassium Chloride                                                                                                                                |                                                                                                                                                       |                                              | Optics, transmits .180 to 20μm                                                                                       | +                                    |
| KF      Potassium Fluoride                                                                                                                                                       |                                                                                                                                                       |                                              | Optics, transmits .160 to 15μm                                                                                       | +                                    |
| KI      Potassium Iodide                                                                                                                                                         |                                                                                                                                                       |                                              | Optics, transmits .25 to 40μm                                                                                        | +                                    |
| Kl(Tl)      Thallium doped Potassium Iodide                                                                                                                                      |                                                                                                                                                       |                                              | Scintillator τ = .24μs, 410nm, 3.13g/cm <sup>3</sup>                                                                 | +                                    |
| RbBr      Rubidium Bromide                                                                                                                                                       |                                                                                                                                                       |                                              | Optics, transmits .21 to 40μm                                                                                        | +                                    |
| RbCl      Rubidium Chloride                                                                                                                                                      |                                                                                                                                                       |                                              | Optics, transmits .21 to 40μm                                                                                        | +                                    |
| RbI      Rubidium Iodide                                                                                                                                                         |                                                                                                                                                       |                                              | Optics, transmits .24 to 50μm                                                                                        | +                                    |
| AgBr      Silver Bromide                                                                                                                                                         |                                                                                                                                                       |                                              | Optics, transmits .45 to 35μm, sheet and formed optics                                                               | +                                    |
| AgCl      Silver Chloride                                                                                                                                                        |                                                                                                                                                       |                                              | Optics, transmits .40 to 30μm, sheet and formed optics                                                               | +                                    |
| NaBr      Sodium Bromide                                                                                                                                                         |                                                                                                                                                       |                                              | Optics, transmits .220 to 23μm                                                                                       | +                                    |

| <b>105</b> The Harshaw Chemical Co.<br>Name(s):      Crystal & Electronic Products Dept.<br>6801 Cochran Rd. Solon, Ohio 44139<br>Inst. & Address:      Telephone: 216-248-7400 |                                                                                                                                                        |                                              |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                           | METHOD*                                                                                                                                                | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| NaCl      Sodium Chloride                                                                                                                                                       | Performance specifications will determine growth method, dimensions, and purity. Harshaw growth capabilities include: N, Sol, Flu, VP, Cz, Br, and St. | Ingot size has not to date been a limitation | Optics, transmits .172 to 17μm, x-ray diffraction plates                                                             | +                                    |
| NaCl      Polytran <sup>R</sup> Sodium Chloride                                                                                                                                 |                                                                                                                                                        |                                              | Optics, transmits, .172 to 17μm, 2000psi yield + Polycrystalline forged optic                                        | +                                    |
| NaF      Sodium Fluoride                                                                                                                                                        |                                                                                                                                                        |                                              | Optics, transmits .13 to 12μm                                                                                        | +                                    |
| NaI      Sodium Iodide                                                                                                                                                          |                                                                                                                                                        |                                              | Scintillator, optic transmits .25 to 25μm                                                                            | +                                    |
| NaI(Tl)      Thallium doped Sodium Iodide                                                                                                                                       |                                                                                                                                                        |                                              | Scintillator τ = .25μs, 420nm, 3.67g/cm <sup>3</sup>                                                                 | +                                    |
| NaI(Tl)      Polyscin <sup>R</sup> Thallium doped Sodium Iodide                                                                                                                 |                                                                                                                                                        |                                              | Scintillator rods, plates and unusual unusual geometries                                                             | +                                    |
| NaNO <sub>3</sub> Sodium Nitrate                                                                                                                                                |                                                                                                                                                        |                                              | Optics, transmits .35 to 3μm                                                                                         | +                                    |
| SrF <sub>2</sub> Strontium Fluoride                                                                                                                                             |                                                                                                                                                        |                                              | Optics, transmits .13 to 11μm                                                                                        | +                                    |
| TlBr      Thallium Bromide                                                                                                                                                      |                                                                                                                                                        |                                              | Optics, transmits .45 to 45μm                                                                                        | +                                    |
| TlBr      Thallium Bromide powder                                                                                                                                               |                                                                                                                                                        |                                              | IR pellets                                                                                                           | +                                    |
| TlCl      Thallium Chloride                                                                                                                                                     |                                                                                                                                                        |                                              | Optics, transmits .40 to 30μm                                                                                        | +                                    |
| TlCl(Be, I)      Beryllium and Iodine doped Thallium Chloride                                                                                                                   |                                                                                                                                                        |                                              | Scintillator τ = 20μs, 465nm, 7.00g/cm <sup>3</sup>                                                                  | +                                    |
| Tl(Br, I)      KRS-5                                                                                                                                                            |                                                                                                                                                        |                                              | Optics, transmits .6 to 40μm                                                                                         | +                                    |

| <b>106</b><br>Name(s): The Harshaw Chemical Co.<br>Inst. & Address: Crystal & Electronic Products Dept.<br>6801 Cochran Rd., Solon, Ohio 44139<br>Telephone: 216-248-7400 |                                                                                                                                                      |                                              |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                     | METHOD*                                                                                                                                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Tl(Cl,Br) KRS-6                                                                                                                                                           | Performance specifications will determine growth method, dimensions, and purity. Harshaw growth capabilities include: M, Sol, Flu, VP, Cz, Br, & St. | Ingot size has not to date been a limitation | Optics, transmits .4 to 32 $\mu$ m                                                                                   | +                                    |
| (Ba,Ca)F <sub>2</sub> T-12                                                                                                                                                |                                                                                                                                                      |                                              | Polyphase optic, transmits 2 to 12 $\mu$ m                                                                           | +                                    |
| YIG Yttrium Iron Garnet                                                                                                                                                   |                                                                                                                                                      |                                              | Microwave ferrite ceramic                                                                                            | +                                    |

| <b>107</b><br>Name(s): C. W. Chu<br>Inst. & Address: Physics Department, University of Houston, Houston, TX 77004<br>Telephone: (713) 749-2842 |                |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                          | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| V <sub>3</sub> Si (single crystal)                                                                                                             | Flux           | 4x0.9x0.5                              | Electrical transport and superconducting properties studied                                                          | -                                    |
| Nb <sub>3</sub> Sn (single crystal)                                                                                                            | Flux           | "                                      | Electrical transport and superconducting properties studied                                                          | -                                    |
| V <sub>3</sub> Si, Nb <sub>3</sub> Ge (films)                                                                                                  |                |                                        | Electrical transport and superconducting properties studied                                                          | -                                    |
| ReRh <sub>4</sub> B <sub>4</sub> , ReMo <sub>6</sub> Se <sub>8</sub>                                                                           | M              | 4 x 3 x 3                              | Superconducting and magnetic properties studied                                                                      | -                                    |
| CuCl                                                                                                                                           | M, VLD<br>Flux | 10 x 5 x 5                             | Transport, thermal and magnetic                                                                                      | +                                    |
| V <sub>2</sub> D                                                                                                                               | Z              | 7 x 1 x 1                              | Transport properties                                                                                                 |                                      |

| 108                                                                   |                                                       |                                        |                                                                                                                                                                                          |                                      |
|-----------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): C. L. Anderson, J. A. Roth, G. S. Picus                      |                                                       |                                        |                                                                                                                                                                                          |                                      |
| Inst. & Address: Hughes Research Laboratories, Malibu CA 90265        |                                                       |                                        | Telephone: (213) 456-6411                                                                                                                                                                |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                                               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                     | Material<br>Avail-<br>ability<br>+ - |
| Si                                                                    | Metal-<br>free<br>solid-<br>phase<br>epitaxy<br>(SPE) | 10x10x0.001                            | Grown by solid phase epitaxy of amorphous Si deposited on crystalline Si substrates in ultra-high vacuum. (100) only. Ref.: Appl. Phys. Lett. <u>31</u> , 689 (1977)                     | Research                             |
| Ge on GaAs                                                            | Metal-<br>free<br>SPE                                 | 10x10x0.001                            | Grown by solid-phase epitaxy of amorphous Ge deposited on crystalline GaAs substrates in ultra-high vacuum. (100) only. Ref. on technique only: Appl. Phys. Lett. <u>31</u> , 689 (1977) | Research                             |

| 109                                                                                       |         |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): G.S. Kamath, G.S. Picus                                                          |         |                                        |                                                                                                                      |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| GaAs                                                                                      | Sol     | 50x50x2                                | n,p, pure ( $10^{13} \text{ cm}^{-3}$ ), hi $\rho$                                                                   | Res.                                 |
| (AlGa)As                                                                                  | Sol     | 50x50x2                                | n,p, pure ( $10^{13} \text{ cm}^{-3}$ ), (Photovoltaic Conf. '78)                                                    | Res.                                 |
| InP                                                                                       | Sol     | 20x20x1                                | n, high purity ( $\mu_{c_{250c}} = 4500 \text{ cm}^2 \text{ v}^{-1} \text{ sec}^{-1}$ )                              | Res.                                 |

| 110                                                                                          |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
|----------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): M. Robinson, R.C. Pastor, M. Braunstein, J.A. Harrington, G.S. Picus                |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| Inst. & Address: Hughes Research Laboratories<br>3011 Malibu Canyon Road, Malibu CA 90265    |         |                                        | Telephone: (213) 456-6411                                                                                                                                                                                                                                                                                                                                                                   |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
| LiF, NaF                                                                                     | CZ, Br  | 80                                     |                                                                                                                                                                                                                                                                                                                                                                                             | Res.                                 |
| MgF <sub>2</sub> , CaF <sub>2</sub> , SrF <sub>2</sub> , BaF <sub>2</sub> , LaF <sub>3</sub> | CZ, Br  | 60                                     | Melting points as a function of purity. Hardness, press forging, optical properties studied. Matl's grown in various reactive atmospheres; for example HF, CF <sub>4</sub> , and BF <sub>3</sub> .<br>CaF <sub>2</sub> absorption coefficient at 3.8 $\mu\text{m}$ = $10^{-4} \text{ cm}^{-1}$ ; SrF <sub>2</sub> absorption coefficient at 3.8 $\mu\text{m}$ = $10^{-4} \text{ cm}^{-1}$ . | Res.                                 |
| PrF <sub>3</sub> NdF <sub>3</sub>                                                            | CZ      | 50                                     |                                                                                                                                                                                                                                                                                                                                                                                             | Res.                                 |
| GdF <sub>3</sub> (Nd <sup>3+</sup> doped)                                                    | CZ      | 10                                     | Melting point, hardness                                                                                                                                                                                                                                                                                                                                                                     | Res.                                 |
| YF <sub>3</sub>                                                                              | CZ      | 3                                      | Melting point                                                                                                                                                                                                                                                                                                                                                                               | Res.                                 |
| HoF <sub>3</sub>                                                                             | CZ      | 80                                     | Laser quality. Hardness of about 8 on MOH scale. Melting point optical properties.                                                                                                                                                                                                                                                                                                          | Res.                                 |
| ErF <sub>3</sub>                                                                             | CZ      | 15                                     | Optical properties                                                                                                                                                                                                                                                                                                                                                                          | Res.                                 |
| TbF <sub>3</sub>                                                                             | CZ      | 60                                     |                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| ThF <sub>4</sub>                                                                             | CZ      | 60                                     | Hardness, optical properties                                                                                                                                                                                                                                                                                                                                                                | Res.                                 |
| KCl                                                                                          | Br      | 10x10x100                              | Absorption coefficient at 5 $\mu\text{m}$ = $10^{-6} \text{ cm}^{-1}$                                                                                                                                                                                                                                                                                                                       | +                                    |

| 111                                                                                       |         |                                        |                                                                                                                                          |                                      |
|-------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): K. Zanio, L. Fraas, G.S. Picus                                                   |         |                                        |                                                                                                                                          |                                      |
| Inst. & Address: Hughes Research Laboratories<br>3011 Malibu Canyon Road, Malibu CA 90265 |         |                                        | Telephone: (213) 456-6411                                                                                                                |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                     | Material<br>Avail-<br>ability<br>+ - |
| Indium phosphide                                                                          | VP      | 10x10x10 <sup>-3</sup>                 | Epitaxy on InP, CdS and GaAs<br>Thin film solar cells, microwave devices<br>infrared detectors<br>J. Electron Mat. <u>7</u> , 211 (1978) | Res<br><br>Progra                    |
| Germanium                                                                                 | VP      | 10x10x10 <sup>-3</sup>                 | Epitaxy on Ge and GaAs<br>High efficiency solar cells<br>J. Vac. Sci. Technol. <u>15</u> , 119 (1978)                                    | Res.<br>Progra                       |

| 112                                                                                                                                                                                                                        |                               |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. Issai Lefkowitz                                                                                                                                                                                               |                               |                                        |                                                                                                                      |                                      |
| Inst. & Address: Department of Physics, Hunter College, CUNY, New York 10031<br>Department of Physics, Univ. of N. C., Chapel Hill, NY 17415<br>US Army Research Office, P. O. Box 12211, Research Triangle Park, NC 27709 |                               |                                        |                                                                                                                      |                                      |
|                                                                                                                                                                                                                            |                               |                                        | Telephone: (919) 549-0641                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                      | METHOD*                       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Alkali Metal Tungsten                                                                                                                                                                                                      | <u>E C</u>                    | 5 x 5 x 5                              |                                                                                                                      | + some-<br>thing                     |
| Bronzes                                                                                                                                                                                                                    | <u>V P</u>                    |                                        |                                                                                                                      |                                      |
| Cu Cl                                                                                                                                                                                                                      | <u>V P</u><br><u>M</u><br>Gel | 5 x 5 x 5                              | amorphous & single crystal                                                                                           | + some-<br>thing                     |

| 113                                                                              |           |                                        |                                                                                                                      |                                      |
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| Name(s): M. W. Shafer                                                            |           |                                        |                                                                                                                      |                                      |
| Inst. & Address: IBM T. J. Watson Research Center, Box 218, Yorktown Heights, NY |           |                                        |                                                                                                                      |                                      |
|                                                                                  |           |                                        | Telephone: 914-945-1007                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)            | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| RuO <sub>2</sub>                                                                 | VP<br>Sub | 6 x 4 x 2                              | Doped with Ir, Mo, & Wo Electrochem ESCA,<br>Transport Properties Measured                                           |                                      |
| IrO <sub>2</sub>                                                                 | Sub       | 6 x 2 x .5                             | Electrochemical and Transport Measurements                                                                           |                                      |
| MoO <sub>2</sub>                                                                 | VP        | 5 x 5 x 3                              | " " "                                                                                                                |                                      |
| WO <sub>2</sub>                                                                  | VP        | 4 x 4 x 3                              | " " "                                                                                                                |                                      |
| Mo <sub>4</sub> O <sub>11</sub>                                                  | VP        | 15x10x1/2                              | " " "                                                                                                                |                                      |
| Mo <sub>8</sub> O <sub>23</sub>                                                  | VP        | 3 x 2 x 2                              | " " "                                                                                                                |                                      |
| Mo <sub>9</sub> O <sub>26</sub>                                                  | VP        | 3 x 2 x 1                              | " " "                                                                                                                |                                      |
| AgI                                                                              | M<br>Sol  | 3 x 3 x 2                              | Raman and Transport Measurements (doped<br>with CuI)                                                                 |                                      |
| TaS <sub>3</sub> TaSe <sub>3</sub>                                               | VP        | 8 x .5 x .2                            | Raman Measurements                                                                                                   |                                      |

| 114                                                                                            |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): R. James Kirkpatrick                                                                  |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Dept. of Geology, University of Illinois, Urbana, IL 61801                    |         |                                        | Telephone: (217) 333-7414                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $\text{CaMgSi}_2\text{O}_6 - \text{CaAl}_2\text{SiO}_6$<br>Pyroxene                            | M       | 3mm<br>(Fibrillar)                     | Rate of Crystal Growth and Phases Present at Large Undercoolings (Am. J. Sci., 274, p. 215, 1974).                   | +                                    |
| $\text{CaMgSi}_2\text{O}_6$ (Diopside) and<br>$\text{CaAl}_2\text{Si}_2\text{O}_8$ (Anorthite) | M       | 1mm max                                | Rate of Crystal Growth at Small Undercoolings (J. Geophys. Res. 81, p. 5715, 1976).                                  | -                                    |
| $\text{CaAl}_2\text{Si}_2\text{O}_8 - \text{NaAlSi}_3\text{O}_8$<br>(Feldspar)                 | M       | 1mm max and<br>Fibrillar               | Rate of Crystal Growth at Small and Large Undercoolings (J. Geophys. Res., in press).                                | -                                    |
| Natural Basalt                                                                                 | M       | 1mm max                                | Rates of Nucleation and Growth in Lava Flows (Geol. Soc. Am. Bull., 88, p. 78, 1977).                                | +                                    |

| 115                                                                                      |         |                                        |                                                                                                                                                                                                                                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): R.A. Milano, M. Feng, T. Lepkowski, L. Zinkiewicz, G.E. Stillman                |         |                                        |                                                                                                                                                                                                                                                                                                                                      |                                      |
| Inst. & Address: 155 EEB, University of Illinois, Dept. of Elect. Eng., Urbana, IL 61801 |         |                                        | Telephone: (217) 333-3097                                                                                                                                                                                                                                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
| 1) GaAs                                                                                  | LE      | 9.52x12.7x.01                          | Both high purity ( $N_A - N_D \sim 2 \times 10^{14}$ ) and heavily doped material have been grown. Dopants-Te, Sn, Ge. All work to date have been on <100> oriented substrates. Hall effect and C-V measurements are used to judge quality of material. Applications include near IR detectors and emitters.                         | X                                    |
| 2) $\text{Al}_x\text{Ga}_{1-x}\text{As}$<br>(.3 < x < .6)                                | LE      | 9.52x12.7x.01                          | Only Sn-doped material with $1 \times 10^{15} < n < 5 \times 10^{16}$ has been examined for use as heterobarriers.                                                                                                                                                                                                                   | X                                    |
| 3) InP                                                                                   | LE      | 9.52x6.35x.358                         | High purity layers ( $n \sim 1 \times 10^{15}$ ) and pin mesa diodes have been grown on both (100) and (111) oriented substrates.                                                                                                                                                                                                    | X                                    |
| 4) $\text{In}_x\text{Ga}_{1-x}\text{As}_y\text{P}_{1-y}$                                 | LE      | 9.52x6.35x.35                          | Varying compositions of this material have been grown to cover the 1.1 $\mu$ 1.3 $\mu$ spectral region. The highest purity to date is $\sim 1 \times 10^{16}$ . Pin photo-detectors with reverse breakdown voltages of 50-60V have been fabricated. For further information see M. Feng et.al. Applied Physics Letters, June 1, 1978 | X                                    |
| 5) GaAs, InP, InGaAsP                                                                    | VE      |                                        | A vapor phase reactor using $\text{AsH}_3$ and $\text{PH}_3$ has been constructed and will be used to grow all of the materials listed                                                                                                                                                                                               |                                      |

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|-----------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): C. T. Sah                                                                            |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Solid State Electronics Laboratory, University of Illinois, Urbana, IL 61801 |         |                                        | Telephone: (217) 333-7133                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Silicon                                                                                       | Cz      | 50x15(LxD)                             | Bi-doped, In-doped, P & Bi double doped, Al-doped,                                                                   | -                                    |
| Silicon                                                                                       | Z       | various                                | Al-doped, P-doped, B-doped                                                                                           | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| RbAg <sub>4</sub> I <sub>5</sub> , NH <sub>4</sub> Ag <sub>4</sub> I <sub>5</sub> , KAg <sub>4</sub> I <sub>5</sub> | Sol     | 5x5x5                                  | Phys. Rev. <u>17</u> , 269 (1978)                                                                                    |                                      |
| FeCl <sub>2</sub> , CoCl <sub>2</sub> (anhydrous)                                                                   | M - Br  | 10x10x2                                | Multicritical point studies                                                                                          |                                      |

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Name(s): Ralph O. Simmons

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University of Illinois at Urbana-Champaign, Urbana, Ill. 61801

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <sup>3</sup> He, <sup>4</sup> He                                      | M       | 1.6x1.6x15                             | In <sup>3</sup> He, <sup>4</sup> He content less than 300 ppm. Growth at constant pressure, in bcc and hcp phases. Thermal vacancy content measured by temperature dependence of x-ray lattice parameter.<br><br>J. Cryst. Growth <u>42</u> , 370 (1977)                     | -                                    |
| CH <sub>4</sub> , CD <sub>4</sub>                                     | M       | 6x6x35                                 | typically 5 to 20 ppm non-isotopic impurities, solid-solid phase transitions, lattice parameters, and thermal expansion studied by x-ray diffraction. Ref. same as He above.                                                                                                 | -                                    |
| Ar, Kr, Xe                                                            | M       | 1x1x15                                 | Growth at constant pressure, to 300 MPa. Study of melting density, (dP/dT), and thermal vacancy properties by x-ray diffraction.<br><br>phys. stat. solidi (a) <u>43</u> , 611 (1977)                                                                                        | -                                    |
| H <sub>2</sub>                                                        | M       | 1x1x2                                  | Study of crystal hcp to fcc and fcc to hcp transitions and of molecular ordering versus ortho-para H <sub>2</sub> composition, at temperatures to 0.1 K, by x-ray diffraction.<br><br>Prof. 15th Int. Conf. on Low Temp. Physics Grenoble (paper by J. V. Gates et al) 1978. | -                                    |

119

Name(s): Paul J. Kruth

Telephone: 412-443-5624

Inst. &amp; Address: International Monocrystals, 2596 Elgro Rd., Gibsonia, PA 15044

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*            | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|--------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Al <sub>2</sub> O <sub>3</sub> (Aluminum Oxide)                       | Ver                | 12 x 50                                | (0001), (1010), (1120); 6-9's pure High-temperature windows; unpolished                                              | from stock                           |
| CaCO <sub>3</sub> (Calcite)                                           | Natural            | 40x40x25                               | (0001) or natural cleavage faces                                                                                     | "                                    |
| CdS (Cadmium Sulfide)                                                 | VP                 |                                        | High-purity raw material & single crystal pieces                                                                     | "                                    |
| GaAs (Gallium Arsenide)                                               |                    | 12 dia x 1 thick                       | Limited quantities; undoped                                                                                          | "                                    |
| Pb (Lead)                                                             | M                  | 75x75x12                               | 100, 110, 111; 5-9's pure; gamma ray, spectrometry plates                                                            | "                                    |
| MgO (Magnesium Oxide)                                                 | Arc                | 10x10x10                               | 100, 110, 111, -- Pure only; high-temp. substrates; infrared & upper UV windows                                      | "                                    |
| SiO <sub>2</sub> (Quartz)                                             | Natural and synth. | 25x50x12                               | 0001, 1010, 1120; windows, unpolished                                                                                | "                                    |
| Other metal crystals:<br>Al, Zn, Sn, Ag, W, Bi, Mg                    |                    |                                        | Limited quantities; limited sizes                                                                                    | "                                    |

| 120                                                                   |         |                                                   |                                                                                                                      |                                      |
|-----------------------------------------------------------------------|---------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s):                                                              |         | S. Daigneault/R. Aldrich                          |                                                                                                                      |                                      |
| Inst. & Address:                                                      |         | Itek Corp., 10 Maguire Road, Lexington, MA. 02173 |                                                                                                                      | Telephone: (617) 272-2207            |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)            | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $\text{Bi}_{12}\text{SiO}_{20}$                                       | Cz      | 45mm diam.                                        | High optical quality (low strain, core free) crystals grown along (111) and (110) axis for use in Itek's PROM.       |                                      |
| $\text{FeO}_2$                                                        | Cz      | 25 x 25 x 50                                      | High optical quality crystals for use in Tunable Acousto Optic Filters, grown along (011) and (001) axis.            |                                      |

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|---------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s):                                                                                    |         | Dr. Robert B. Somoano                                                           |                                                                                                                                                                                                                                                                                                                                              |                                      |
| Inst. & Address:                                                                            |         | Jet Propulsion Laboratory<br>4800 Oak Grove Drive<br>Pasadena, California 91103 |                                                                                                                                                                                                                                                                                                                                              | Telephone: (213) 354-2213            |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                          | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
| $\text{TTF}_{12}\text{SECN}_7$<br>(Tetrathiafulvalene) $_{12}^{2-}$<br>(selenacyanate) $_7$ | Sol     | 5 x 0.1 x 0.01                                                                  | Crystals grown in the form of long needles, with highly reflecting faces; the crystals are organic metals and the electrical, magnetic, optical, and structural properties have been measured.                                                                                                                                               | +                                    |
| $\text{TTF}_{12}(\text{SCN})_7$<br>(Tetrathiatetracene) $_{12}^{2-}$<br>(thiocyanate) $_7$  | Sol     | 5 x 0.1 x 0.01                                                                  | Ref. R. B. Somoano, A. Gupta, V. Hadek, M. Novotny, M. Jones, T. Datta, R. Deck, and A. M. Hermann, Phys. Rev., B <u>15</u> , 595 (1977).                                                                                                                                                                                                    |                                      |
| $\text{TTT}_2\text{I}_3$<br>(Tetrathiatetracene) $_2$ (iodide) $_3$                         | Sol     | 5 x 0.1 x 0.01                                                                  | Crystals grown in the form of long needles, with highly reflecting faces; the crystals are organic metals and the electrical, magnetic, optical, and structural properties have been measured.<br><br>Ref. R. B. Somoano, S. P. S. Yen, V. Hadek, S. K. Khanna, M. Novotny, T. Datta, A. M. Hermann, and J. A. Woollam, Phys. Rev. B (1978). | +                                    |

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Name(s): Charles Feldman

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| B Boron                                                               | Sub     | 25.4x8.4<br>x 10 <sup>-3</sup>         | Amorphous films on fused silica. SIMS analysis, electrical, optical measurements. Effect of C & H on electrical conductivity.<br><br>See: "Amorphous Boron Films" in Boron and Refractory Boride - Ed. V. F. Matkovich, Springer Verlag 1977, p. 581                                                              |                                      |
| Si Silicon                                                            | Sub     | 25.4x8.4<br>x 10 <sup>-2</sup>         | Polycrystalline and amorphous films on sapphire, glass, fused silica. SIMS analysis, electrical properties studied. Boron doped films. Studies of device applications.<br><br>See: Evaporated Polycrystalline Silica Films for Photovoltage Application - Grain Size Effects, J. Electron Materials 7, 309 (1978) |                                      |

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Name(s): Lambda/Airtron, division of Litton Systems, Inc.

Dr. Roger F. Belt

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Morris Plains, New Jersey 07950

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Y <sub>3</sub> Al <sub>5</sub> O <sub>12</sub> , yttrium aluminum garnet         | Cz      | 40x40x200                              | 99.99%, [111] [100] rare earths                                                                                      | +                                    |
| Gd <sub>3</sub> Ga <sub>5</sub> O <sub>12</sub> , gadolinium gallium garnet      | Cz      | 50x50x200                              | rare earths                                                                                                          | +                                    |
| YAlO <sub>3</sub> , yttrium orthoaluminate                                       | Cz      | 25x25x150                              | 99.99%, [010] [001] rare earths                                                                                      | +                                    |
| Y <sub>3</sub> Fe <sub>5</sub> O <sub>12</sub> , yttrium iron garnet             | Flu     | 25x25x25                               | 99.99%, Ga                                                                                                           | +                                    |
| CaLa <sub>4</sub> (SiO <sub>4</sub> ) <sub>3</sub> O, calcium lanthanum silicate | Cz      | 25x25x150                              | 99.9%, [001] rare earths                                                                                             | +                                    |
| ZnO, zinc oxide                                                                  | Hyd     | 50x50x15                               | 99.99%, [1010] [0001]                                                                                                | +                                    |
| AlPO <sub>4</sub> , aluminum phosphate                                           | Hyd     | 10x10x10                               | 99.99%                                                                                                               | +                                    |
| KTiOPO <sub>4</sub> , potassium titanyl phosphate                                | Hyd     | 5x5x5                                  | 99.9%                                                                                                                | +                                    |
| ZrO <sub>2</sub> , zirconium dioxide                                             | Z       | 20x25x25                               | 99.9%, Ca, Y, Mg                                                                                                     | +                                    |
| LiYF <sub>4</sub> , lithium yttrium fluoride                                     | Cz      | 5x5x150                                | 99.9%, rare earths                                                                                                   | +                                    |
| YF <sub>3</sub> , yttrium fluoride                                               | Cz      | 5x5x100                                | 99.9%, rare earths                                                                                                   | +                                    |
| KY <sub>3</sub> F <sub>10</sub> , potassium yttrium fluoride                     | Cz      | 10x10x100                              | 99.9%, rare earths                                                                                                   | X                                    |

| <b>124</b><br>Name(s): Robert Goldstein<br>Inst. & Address: Lasermetrics, Inc.<br>111 Galway Place, Teaneck, New Jersey 07666<br>Telephone: 201-837-9090 |         |                                        |                                                                                                                               |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.          | Material<br>Avail-<br>ability<br>+ - |
| (NH <sub>4</sub> )H <sub>2</sub> PO <sub>4</sub> - ammonium phosphate<br>(ADP)                                                                           | Sol     | 150x150x150                            | All optical quality single crystals<br><br> | +                                    |
| (ND <sub>4</sub> )D <sub>2</sub> PO <sub>4</sub> - deuterated ammonium<br>phosphate (AD*P)                                                               | "       | 50x50x75                               |                                                                                                                               | +                                    |
| KH <sub>2</sub> PO <sub>4</sub> - potassium phosphate<br>(KDP)                                                                                           | "       | 200x200x220                            |                                                                                                                               | +                                    |
| KD <sub>2</sub> PO <sub>4</sub> - deuterated potassium<br>phosphate (KD*P)                                                                               | "       | 100x100x175                            |                                                                                                                               | +                                    |
| (NH <sub>4</sub> )H <sub>2</sub> AsO <sub>4</sub> - ammonium arsenate<br>(ADA)                                                                           | "       | 30x30x50                               |                                                                                                                               | +                                    |
| (ND <sub>4</sub> )D <sub>2</sub> AsO <sub>4</sub> - deuterated<br>ammonium arsenate<br>(AD*A)                                                            | "       | 30x30x50                               |                                                                                                                               | +                                    |
| CsD <sub>2</sub> AsO <sub>4</sub> - cesium dideuterium<br>arsenate (CD*A)                                                                                | "       | 25x25x50                               |                                                                                                                               | -                                    |
| LiIO <sub>3</sub> - lithium iodate                                                                                                                       | "       | 30x30x75                               |                                                                                                                               | +                                    |
| LiCHO <sub>2</sub> ·H <sub>2</sub> O - lithium formate<br>monohydrate                                                                                    | "       | 50x50x80                               |                                                                                                                               | +                                    |

| <b>125</b><br>Name(s): Robert Goldstein<br>Inst. & Address: Lasermetrics, Inc.<br>111 Galway Place, Teaneck, New Jersey 07666<br>Telephone: 201-837-9090 |         |                                        |                                                                                                                                 |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.            | Material<br>Avail-<br>ability<br>+ - |
| NaClO <sub>3</sub> - sodium chlorate                                                                                                                     | Sol     | 25x25x25                               | All optical quality single crystals<br><br> | +                                    |
| NaBrO <sub>3</sub> - sodium bromate                                                                                                                      | "       | 25x25x25                               |                                                                                                                                 | +                                    |
| NaNO <sub>2</sub> - sodium nitrite                                                                                                                       | "       | 20x20x40                               |                                                                                                                                 | +                                    |
| NiSO <sub>4</sub> ·6H <sub>2</sub> O - nickel sulfate                                                                                                    | "       | 50x50x50                               |                                                                                                                                 | +                                    |
| (NH <sub>2</sub> CH <sub>2</sub> COOH) <sub>3</sub> H <sub>2</sub> SO <sub>4</sub> - triglycine<br>sulfate (TGS)                                         | "       | 75x75x75                               |                                                                                                                                 | +                                    |
| NH <sub>4</sub> OOC <sub>2</sub> COONH <sub>4</sub> ·H <sub>2</sub> O - ammonium<br>oxalate monohydrate (AMO)                                            | "       | 20x20x40                               |                                                                                                                                 | +                                    |
| HOOC <sub>6</sub> H <sub>4</sub> COOK - potassium acid<br>phthalate (KAP)                                                                                | "       | 75x75x100                              |                                                                                                                                 | +                                    |
| Ba(NO <sub>2</sub> ) <sub>2</sub> - barium nitrite                                                                                                       | "       | 10x10x10                               |                                                                                                                                 | +                                    |
| Hg <sub>2</sub> Cl <sub>2</sub> - mercurous chloride                                                                                                     | Sub     | 10 <sup>3</sup>                        |                                                                                                                                 | -                                    |

126

Name(s): J. Washburn, K. Seshan, B. Chin

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Single crystals of<br>CdS Cadmium Sulphide<br>Cd(Zn)S Cadmium Zinc Sulphide<br><br>*Grown by Hot Wall Vapor Deposition<br>Process | VP*     | 1cmx1cm<br>X10-30µm<br>thick           | Purity: Not determined. Expected two 9's. pure<br><br>Orientation: Grown heteroepitaxially on single<br>crystal on (111) and 14° off (111), conducting<br>and semi-insulating GaAs substrates on both Ga<br>and As faces.<br><br>Dopants: none added. Autodoped n type.<br><br>Properties: heterojunction with Cu <sub>x</sub> S. Hall<br>measurements of mobility, carrier concentration<br>and resistivity.<br><br>Characterization: SEM-EDAX, TEM, XRD<br><br>Applications: Heterojunction Solar Cells.<br><br>Publications: UCID Reports 4044, 4009, 3940 and<br>3979. | +                                    |

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Name(s): Eugene E. Haller, G. Scott Hubbard, William L. Hansen

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Exts. 5632 and 5294

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD*     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)      | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------|-------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. Ultrapure Polycrystalline<br>Germanium<br><br>2. Ultrapure Single Crystal<br>Germanium | Z<br><br>Cz | 35w x 29h<br>x 600µ<br><br>45 dia x<br>200µ | Net electrical active impurity concentration $\sim 10^{10}$<br>cm <sup>-3</sup> , measured by Hall effect and conductivity. <sup>1</sup><br>Residual impurities B, Al, Ga, P, determined by<br>photoelectric spectroscopy (PES). <sup>2</sup> [100], [111],<br>[113] oriented crystals grown. Material used for<br>radiation detectors <sup>3</sup> and studies of solid state<br>interactions in an ultrapure medium. <sup>4,5,6</sup><br><br>1. IEEE Trans. Nucl. Sci., NS-23, No. 1, 81 (1976)<br>2. IEEE Trans. Nucl. Sci., NS-22, No. 1, 127 (1975)<br>3. IEEE Trans. Nucl. Sci., NS-19, No. 1, 265 (1972)<br>4. Rad. Eff. in Semiconductors 1976, Inst. Phys.<br>Conf. Ser. No. 31, 309 (1977).<br>5. IEEE Trans. Nucl. Sci., NS-24, No. 1, 48 (1977)<br>6. Phys. Rev. Lett., Vol. 40, No. 9 584 (1978)<br><br>+Material may not be sold, small research samples<br>available. | (+)+                                 |

| 128                                                                                                         |                        |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Guy A. Armantrout                                                                                  |                        |                                        |                                                                                                                      |                                      |
| Inst. & Address: Lawrence Livermore Laboratory, P. O. Box 5504, Livermore, CA 94550 Telephone: 415/422-8616 |                        |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                       | METHOD*                | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Cu <sub>2</sub> S                                                                                           | Reac.<br>Sputt.        | 0.5 µm<br>Films                        | Part of Heterojunction Cu <sub>2</sub> S-CdS Solar Cells                                                             | +                                    |
| Germanium                                                                                                   | Cz                     | 7 cm<br>7 cm<br>7 cm                   | High Purity<br>Detector Grade<br>Germanium                                                                           | +                                    |
| CdS                                                                                                         | Evap.<br>and<br>Sputt. | 50 µm<br>Films                         | Heavily doped CdS for Solar Cells                                                                                    | +                                    |

| 129                                                                                                        |         |                                        |                                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Richard L. Landingham                                                                             |         |                                        |                                                                                                                                                                                              |                                      |
| Inst. & Address: Lawrence Livermore Laboratory, P. O. Box 808, Livermore, CA 94550 Telephone: 415-422-8022 |         |                                        |                                                                                                                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                         | Material<br>Avail-<br>ability<br>+ - |
| Sialon Family of Materials                                                                                 | VP      | 38 dia - 13                            | Amorphous and crystalline deposits for protective<br>coatings on reaction bonded silicon nitride turbine<br>components (ceramic helical expander) UCRL-77905,<br>UCRL-52390, and UCID-17805. | -                                    |

| 130                                                                                                          |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. Herbert W. Newkirk                                                                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Lawrence Livermore Laboratory, P. O. Box 808, Livermore, CA 94550 Telephone: (415)-422-9539 |         |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| CdS Cadmium Sulfide                                                                                          | VP      | 25                                     |                                                                                                                      | +                                    |
| CdTe Cadmium Telluride                                                                                       | VP      | 25                                     |                                                                                                                      | +                                    |
| AlSb Aluminum Antimonide                                                                                     | M       | 25                                     |                                                                                                                      | +                                    |
| BeF <sub>2</sub> Beryllium Fluoride                                                                          | Flu & M | 25                                     |                                                                                                                      | +                                    |
| BeO Beryllium Oxide                                                                                          | Flu     | 10                                     |                                                                                                                      | +                                    |
| Si Silicon                                                                                                   | M       | 4 in.                                  |                                                                                                                      | +                                    |
| Ge Germanium                                                                                                 | M       | 4 in.                                  |                                                                                                                      | +                                    |
| CuS Copper Sulfide                                                                                           | VP      | 25                                     |                                                                                                                      | +                                    |

| 131                                                                                                                                                                                                                                                                                         |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): M. J. Weber, W. L. Smith, D. Milam                                                                                                                                                                                                                                                 |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Lawrence Livermore Laboratory, Box 5508, L-465, Livermore, CA 94550 Telephone: 415/422-8209                                                                                                                                                                                |         |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Alkaline-earth fluorides<br>(MgF <sub>2</sub> , BaF <sub>2</sub> , PbF <sub>2</sub> , CaF <sub>2</sub> )<br>Alkali-halides<br>(LiF, NaF, NaCl)<br>Beryllium fluoride crystals & glasses<br>(BeF <sub>2</sub> )<br>Silicates (glasses)<br>Phosphates (glasses)<br>Fluorophosphates (glasses) |         |                                        | Spectroscopic and Nonlinear Optical Properties                                                                       |                                      |

| <b>132</b><br>Name(s): Leybold-Heraeus Vacuum Products Inc.<br>Inst. & Address: 200 Seco Road, Monroeville, PA 15146<br>Telephone: 412 856-9030 |                             |                                        |                                                                                                                                    |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                           | METHOD*                     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.               | Material<br>Avail-<br>ability<br>+ - |
| Laboratory and Production Crystal<br>Growers                                                                                                    | Z<br>Cz<br>Br<br>Kyropoulos | 2440 mm x<br>2440 mm x<br>8530 mm      | Leybold-Heraeus offers upon request, Cz and<br>Hot Zone Units with crucible capacities up<br>to 45 Kgm and diameters up to 127 mm. |                                      |

| <b>133</b><br>Name(s): N. P. Barnes, M. S. Piltch<br>Inst. & Address: Los Alamos Scientific Laboratory<br>P.O. Box 1663 MS 564, Los Alamos, NM 87545<br>Telephone: (505) 667-7102 |         |                                        |                                                                                                                                                                                     |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                | Material<br>Avail-<br>ability<br>+ - |
| CdTe, Cadmium Telluride                                                                                                                                                           | BR      | 10 x 30 x .2                           | Temperature dependent sellmeier coefficients and<br>coherence length for infrared second harmonic<br>generation.<br><br>Journal of the Optical Soc. of America <u>67</u> 628 (1977) | +                                    |

| <b>134</b><br>Name(s): Roger Eckhardt, Lawrence B. Edgett<br>Inst. & Address: Los Alamos Scientific Laboratory<br>P.O. Box 1663, Los Alamos, NM 87545<br>Telephone: (505) 667-7102 |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| AgGaSe <sub>2</sub>                                                                                                                                                                | Br      | 14 mm dia<br>50 mm length              | "The Second Phase Precipitate in AgGaSe <sub>2</sub> "<br><br>Eckhardt & Edgett, presented at ICCG5, July 1977       | none                                 |
| CdGeAs <sub>2</sub>                                                                                                                                                                | Br      | -----                                  | Extensive cracking, low transparency                                                                                 | none                                 |

| <b>135</b><br>Name(s): M. S. Piltch, Roger Eckhardt, Ronald Hinsley<br>Inst. & Address: Los Alamos Scientific Laboratory<br>Box 1663 MS 564, Los Alamos, NM 87545<br>Telephone: (505) 667-7102 |         |                                        |                                                                                                                                                                                         |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                    | Material<br>Avail-<br>ability<br>+ - |
| CdTe, Cadmium Telluride                                                                                                                                                                        | Br      | 10 x 30 x .5                           | Intracavity second harmonic generation of CO <sub>2</sub> laser<br>radiation.<br><br>Proceedings of Electro-Optics 77 Conf., Anaheim, CA<br>October 1977.                               | +                                    |
| ZnSe, Zinc Selenide                                                                                                                                                                            | VP      | 10 x 12 x 2                            | Measurement of nonlinear optical coefficient and<br>second harmonic coherence length for the non-bire-<br>fringent single crystal.<br><br>Optics Communications <u>22</u> , 239 (1977). | -                                    |

136

Name(s): M. S. Pillich, C. Tallman, J. Rink

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdGeAs <sub>2</sub> , Cadmium Germanium Arsenide                      | Br      | 4 x 10 x 12                            | Nonlinear infrared pulsed difference frequency mixing<br>using CO <sub>2</sub> and CO lasers.<br>Optics Communications <u>15</u> 112 (1975). | +                                    |

137

Name(s): M. S. Pillich, C. D. Cantrell, R. C. Sze

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdTe, Cadmium Telluride                                               | Br      | 9 x 28 x .9                            | Use of oriented non-birefringent single crystal<br>plates to generate infrared second harmonic<br>radiation of 10 micrometer CO <sub>2</sub> laser wavelengths.<br>Journal of Applied Physics <u>47</u> 3514 (1976). | +                                    |

138

Name(s): William J. McCreary

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Telephone: 505-667-5192

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Mo <sub>2</sub> C, Molybdenum dicarbide                               | CVD     | << 1 mm to<br>>> 1 mm                  | FCC, Crystallite size ~ 40 Å, A <sub>0</sub> =<br>4.183 ± 0.008 Å, tensile properties.<br>Hollow spherical laser fusion targets. | -                                    |

139

Name(s): Robert W. Springer and Duane S. Catlett

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Telephone: (505) 667-4258

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Aluminum-Al <sub>x</sub> O <sub>y</sub> Composites                    | VP      | 125x125x.05                            | 5 n's pure aluminum is evaporated in a vacuum.<br>During deposition, a precise amount of oxygen is<br>introduced for a short time, thus giving a periodic<br>structure to the material. The period determines<br>the mechanical properties.<br>Characterization: Tensile test, Auger Electron<br>Spectroscopy and Depth Profiling, Scanning Electron<br>Microscopy, Residual Gas Analysis.<br>Paper: Structure and Mechanical Properties of Al-<br>Al <sub>x</sub> O <sub>y</sub> Vacuum Deposited Laminates submitted to the<br>proceedings of the Third International Metallurgical<br>Coatings Conference. April 1978. | -                                    |

| 140                                                                   |         |                                        |                                                                                                                                                                                                                   |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): H. Piller                                                    |         |                                        |                                                                                                                                                                                                                   |                                      |
| Inst. & Address: Dept. of Phys. & Astr., LSU, Baton Rouge, LA 70803   |         |                                        | Telephone: (504)388-8477                                                                                                                                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                              | Material<br>Avail-<br>ability<br>+ - |
| $Pb_{1-x}Sn_xTe$ ( $x=0.2$ )                                          |         | 5x10x1                                 | Electroreflectance and Faraday Rotation<br>in $Pb_{1-x}Sn_xTe$ , IL NUOVO CIMENTO, <u>39B</u> , 392<br>(1977)<br><br>Single crystals from Dr. R. A. Chapman<br>of Texas Instruments res. labs. in Dallas,<br>Tex. |                                      |

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|--------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): G. H. Dierksen, T. Gabor                                                                |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: 3M Company, Central Research Laboratories - 201-1E<br>St. Paul, Minnesota 55101 |         |                                        | Telephone: (612)733-2497                                                                                             |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Cadmium Sulfide<br>Single crystal seeded                                                         | VP      | cylinder<br>d=35; h=35                 | Spectrographic Anal., approximately 1 ppm<br>total impurities. Laser quality.<br>J. of Cryst. Growth 43 (1978) 572   | (-)                                  |

| 142                                                                    |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Paul R. Camp                                                  |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: University of Maine, Bennett Hall, Orono, Maine 04473 |         |                                        | Telephone: (207)581-7745                                                                                             |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ice and zoned refined water                                            | M       | 56 mm x<br>56 mm x<br>600 mm           | Purity - $C_1$ axis                                                                                                  | +                                    |

| 143                                                                                       |                         |                                        |                                                                                                                                                                                                                          |                                      |
|-------------------------------------------------------------------------------------------|-------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): S.D. Mittleman                                                                   |                         |                                        |                                                                                                                                                                                                                          |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD*                 | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                     | Material<br>Avail-<br>ability<br>+ - |
| $CuInS_2$ - Copper Indium Sulfide                                                         | Br<br>and thin<br>films | 10mm dia x<br>40 mm long               | Doped both n- and p-type. Used in solar cell<br>applications.<br><br>S.S. Comm. <u>22</u> 659 (1977) Proc. 12th Photovoltaic<br>Specialists Conf. <u>12</u> 534, 1977.<br><br>J.A. Physics <u>48</u> 3878 (1977)         |                                      |
| $CuInSe_2$ - Copper Indium Selenide                                                       | Br<br>and thin<br>films | 10mm dia<br>x-40mm<br>long.            | n- and p-type for solar cell applications.<br>Proc. 12th Photovoltaic Specialist Conf. <u>12</u><br>534(1977).<br><br>Electrical Properties of Schottky Barrier Solar Cells<br>Utilizing Single Crystals of $CuInSe_2$ . |                                      |

| 144                                                                                                            |         |                                        |                                                                                                                                                                                                                                                                                     |                                      |
|----------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): S. D. Mittleman and J.F.Vetelino                                                                      |         |                                        |                                                                                                                                                                                                                                                                                     |                                      |
| Inst. & Address: Department of Electrical Engineering, Barrows Hall, University of Maine<br>Orono, Maine 04473 |         |                                        | Telephone: (207) 581-7516                                                                                                                                                                                                                                                           |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                | Material<br>Avail-<br>ability<br>+ - |
| $\text{AlPO}_4$ - Berlinite                                                                                    |         | 4x6x10mm                               | Theoretical Studies and Experimental Verification of<br>Surface Acoustic Wave (SAW) Properties. Esp.<br>Temperature Compensated Cuts<br><br>Proc. IEEE Ultrasonics Symposium, Sept. 28, 1976<br><br>J.A.P. <u>48</u> 887(1977).<br><br>Appl. Phys. Letters, <u>33</u> , 117 (1978). |                                      |

| 145                                                                                   |             |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |
|---------------------------------------------------------------------------------------|-------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): W. A. Beck, T. S. Sun, N. E. Byer                                            |             |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |
| Inst. & Address: Martin Marietta Laboratories, 1450 S. Rolling Rd., Balto., Md. 21227 |             |                                        | Telephone: 301/247-0700                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                 | METHOD*     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
| $\text{PbTe}$ and $\text{Pb}_{.8}\text{Sn}_{.2}\text{Te}$                             | GE<br>(MBE) | 10x10x0.01                             | (111) Orientation;<br>P-type, stoichiometrically adjusted;<br><u>Properties studied:</u> Hall mobility; conductivity;<br>x-ray diffraction; properties of sputtered & oxi-<br>dized surfaces by Auger, x-ray and ultraviolet<br>electron spectroscopy; Schottky junction proper-<br>ties; effect of electron beam on the sticking co-<br>efficient of film to substrate.<br><u>Application:</u> Infrared photodiodes<br><u>Publications:</u><br>"Oxygen Uptake on Epitaxial $\text{PbTe}$ (111) Surfaces,"<br>T.S. Sun, N.E. Byer, J.M. Chen, J. Vac. Sci. and<br>Technol., <u>15</u> , 585 (1978).<br>"Oxygen Uptake on Epitaxial $(\text{PbSn})\text{Te}$ (111) Surfaces,"<br>T.S. Sun, S.P. Buchner, N.E. Byer and J.M. Chen,<br>To be published in J. Vac. Sci. & Technol.<br><br>"Electron Beam Delineation of $(\text{Pb},\text{Sn})\text{Te}$ Arrays,"<br>W.A. Beck, S.P. Buchner and N.E. Byer. IRIS Spec.<br>Group Meeting, Detector & Imaging Groups, Annapolis,<br>Md., June 15, 1978. | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Robert E. Fahey                                              |         |                                        |                                                                                                                                                                                                      |                                      |
| Inst. & Address: Lincoln Laboratory, M.I.T., Lexington, MA 02173      |         |                                        | Telephone: 617-862-5500<br>Ext. 491                                                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                 | Material<br>Avail-<br>ability<br>+ - |
| MgF <sub>2</sub> -- magnesium fluoride                                | Thermal | 25 (diameter)<br>x 85 (length)         | Growth axis of unseeded boules 30° from c-axis.<br>Dopants: Ni <sup>2+</sup> , Co <sup>2+</sup><br>Tunable source of coherent infrared radiation<br>Journal of Crystal Growth <u>42</u> , 569 (1977) | Limited                              |
| Ba <sub>2</sub> TiSi <sub>2</sub> O <sub>8</sub> -- fresnoite         | Cz      | 15 (diameter)<br>x 40 (length)         | Surface acoustic wave properties<br>Appl. Phys. Lett. <u>32</u> , 203 (1978)                                                                                                                         | Limited                              |

| 147                                                                   |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): S. H. Groves                                                 |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: M.I.T. Lincoln Laboratory, Lexington, Mass. 02173    |         |                                        | Telephone: (617)-862-5500<br>Ext 5836                                                                                |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| In P                                                                  | LE      | 10                                     | Undoped, $N_d - N_a = 2 \times 10^{15} \text{ cm}^{-3}$<br>$N_d/N_a = 6$                                             |                                      |
| M <sub>1-x</sub> Ga <sub>x</sub> As <sub>y</sub> P <sub>1-y</sub>     | LE      | 10                                     | Undoped, $N_d - N_a = 2 \times 10^{15} \text{ cm}^{-3}$<br>$N_d/N_a = 2$                                             |                                      |
| PbTe, PbSnTe                                                          | LE      | 10                                     | DH diode Lasers                                                                                                      |                                      |
| PbTe, PbSnTe                                                          | VP      | 20                                     | T <sub>g</sub> doped, substrate material                                                                             |                                      |

| 148                                                                   |         |                                        |                                                                                                                                              |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): John Melngailis, R. E. Fahey and E. Stern                    |         |                                        |                                                                                                                                              |                                      |
| Inst. & Address: MIT Lincoln Laboratory, Lexington, Mass. 02173       |         |                                        | Telephone: 617-862-5500<br>X5487 or X359                                                                                                     |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                         | Material<br>Avail-<br>ability<br>+ - |
| Ba <sub>2</sub> Si <sub>2</sub> TiO <sub>8</sub> Fresnoite            | M       | 40x15x15                               | Single crystal, no intentional dopants, surface<br>acoustic wave propagation studied, see Appl. Phys.<br>Lett. <u>32</u> p. 203 15 Feb. 1978 | (-)                                  |

| 149                                                                   |         |                                        |                                                                                                                      |                                          |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Name(s): Alan J. Strauss                                              |         |                                        |                                                                                                                      |                                          |
| Inst. & Address: Lincoln Laboratory, M.I.T., Lexington, MA 02173      |         |                                        | Telephone: (617) 862-5500<br>Ext. 481                                                                                |                                          |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ -     |
| CdTe- cadmium telluride                                               | Br      | 20x20x50                               | In-doped $\sim 1 \times 10^{17} \text{ cm}^{-3}$ for conversion to<br>semi-insulating. Electrooptic modulators.      | small<br>quantities<br>for re-<br>search |

| <b>150</b><br>Name(s): August F. Witt<br>Inst. & Address: Room 13-4134, MIT, Cambridge, Mass. 02139<br>Telephone: (617)253-5303 |               |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                           | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| InSb                                                                                                                            | LE,<br>Cz, Br | 20 x 150                               | Intrinsic to heavily-doped (p & n)                                                                                   | limited                              |
| Ge                                                                                                                              | Cz, Br        | 20 x 150                               | Intrinsic to heavily-doped (p & n)                                                                                   | limited                              |
| GaAs                                                                                                                            | LE            | 0.2                                    | Intrinsic to heavily-doped (p & n)                                                                                   | limited                              |

| <b>151</b><br>Name(s): Paul Frieberthausen<br>Inst. & Address: McDonnell Douglas Astronautics Company<br>5301 Bolsa Ave., Huntington Beach, CA 92647<br>Telephone: (714) 896-1940 |         |                                        |                                                                                                                           |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.      | Material<br>Avail-<br>ability<br>+ - |
| Gallium Arsenide, GaAs                                                                                                                                                            | VP      | diameter to<br>75 MM                   | n and P dopants, Hall effect measurements. Carrier<br>concentration, range from $10^{10}$ to $10^{18}$ cm <sup>-3</sup> . | +                                    |

| <b>152</b><br>Name(s): Gerald L. Pollack<br>Inst. & Address: Physics Department, Michigan State University, East Lansing, MI 48824<br>Telephone: (517) 355-9709 |                       |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                           | METHOD*               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ar, Argon                                                                                                                                                       | VLS, Z<br>Modified Br | 1x1x5                                  | For measurement of thermal conductivity, sublimation<br>pressure, etc.                                               |                                      |

| <b>153</b><br>Name(s): Robert Gerson, P. S. Nayar, E. B. Hale and C. M. Cooper<br>Inst. & Address: University of Missouri - Rolla, Physics Dept., Rolla, MO 65401<br>Telephone: 341-4793 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
| SrTiO <sub>3</sub> (strontium titante)                                                                                                                                                   | Ver     | 5 X 20 X<br>4X10 <sup>-4</sup>         | Boron doping by ion implantation to produce n-type<br>semiconductors for implant doses of $10^{16}$ to $10^{17}$ cm <sup>-2</sup><br>Resistance varies from $10^6$ to $10^3$ ohms/square.<br>Conductivity, Seebeck effect, and Hall effect as a<br>function of temperature. Samples are sliced from<br>boule obtained from N L Industries with no<br>deliberate doping.<br>Bull. Am. Phys. Soc. <u>23</u> (1978) 367. | +                                    |

| 154                                                                     |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |
|-------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): P. S. Nayar                                                    |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |
| Inst. & Address: Dept. Physics, Univ. Missouri-Rolla<br>Rolla, MO 65401 |         |                                        | Telephone: 341-4793                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
| Thallium Selenide (TlSe)                                                | Br, Z   | 50mm (l)<br>6mm (d)                    | 1 ohm-Cm to 50 ohm-Cm P-type<br>Conductivity, Hall effect, Seebeck effect, doping<br>and band structure. Low temperature conductivity.<br>Low temperature infrared detector.<br>J. Phys. Soc. Japan 23, 144 (1967)<br>J. Appl. Phys. 39, 359, 4465 (1968)<br>J. Appl. Phys. 40, 123 (1969)<br>J. Phys. Chem. Solids 31, 3167 (1970)<br>Infrared Phys. 14, 31 (1974)<br>J. Opt. Soc. Am. 65, 831 (1975)<br>Appl. Opt. 16, 2942 (1977) | -                                    |

| 155                                                                            |                  |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------|------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Monocrystals Company                                                  |                  |                                        |                                                                                                                      |                                      |
| Inst. & Address: 1721 Sherwood Blvd., Cleveland, Ohio 44117                    |                  |                                        | Person to contact: Virgil E. Straughan<br>Telephone: 486-2959                                                        |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)          | METHOD*          | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| SINGLE CRYSTALS OF METALS<br>AND ALLOYS FROM STOCK OR ON<br>CUSTOM ORDER BASIS |                  |                                        |                                                                                                                      |                                      |
| Antimony                                                                       | Br               | 37 x 150 long                          | 49s and 59s, major orientations                                                                                      |                                      |
| Bismuth                                                                        | Br               | 25 d. x 50                             | 59s                                                                                                                  |                                      |
| Cadmium                                                                        | Br               | 18 d. x 150                            | 59s                                                                                                                  |                                      |
| Cobalt                                                                         | Br               | 25 d. x 75                             | 49s, random orientation only                                                                                         |                                      |
| Copper                                                                         | Br               | 50 d. x 150                            | 49s and 59s, major orientations                                                                                      |                                      |
| Indium                                                                         | Br               | 12 d. x 100                            | 59s, random orientation only                                                                                         |                                      |
| Iron                                                                           | strain<br>anneal | 9 d. x 75                              | 39s, oriented discs                                                                                                  |                                      |
| Lead                                                                           | Br               | 18 d. x 100                            | 59s                                                                                                                  |                                      |
| Nickel                                                                         | Br               | 37 d. x 75                             | Carbonyl Ni, oriented shapes, major orientations                                                                     |                                      |
| Silver                                                                         | Br               | 25 d. x 150                            | 59s, oriented shapes, major orientations                                                                             |                                      |
| Tin                                                                            | Br               | 18 d. x 100                            | 49s, 59s, 69s, oriented shapes, major orientations                                                                   |                                      |
| Zinc                                                                           | Br               | 37 d. x 100                            | 49s, 59s, oriented specimens                                                                                         |                                      |
| Alloys: CoFe, NiCo, NiFe, NiCu,<br>SiFe, CuZn, and others upon request         |                  |                                        |                                                                                                                      |                                      |

| 156                                                                         |         |                                        |                                                                                                                                 |                                      |
|-----------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Kedar P. Gupta,* Robert O. Gregory and Melvin Rossnick             |         |                                        |                                                                                                                                 |                                      |
| Inst. & Address: *Monsanto Company - P. O. Box 8, St. Peters, Mo. 63376 USA |         |                                        | Telephone: 314-434-1698                                                                                                         |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.            | Material<br>Avail-<br>ability<br>+ - |
| Silicon, Semiconductor Grade                                                | Z       | 50x50x400                              | Limitations in Using Kiloherzt Radio Frequencies<br>for Float-Zone Silicon Crystals, to be published<br>in J. of Crystal Growth | +                                    |

| 157                                                                                  |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
|--------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Nicholas C. Lias, Gen. Mgr.; Joseph F. Balascio, Res. & Dev.                |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
| Inst. & Address: Motorola, Inc., Quartz Operations, P.O. Box 279, Carlisle, PA 17013 |         |                                        | Telephone: (717) 249-1456                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
| SiO <sub>2</sub> (alpha quartz)                                                      | Hyd     | 86.4x177.8<br>x 63.5<br><br>X x Y x Z  | <u>Purity</u><br>Acoustic, electronic and optical grades<br><br><u>Orientation</u><br>0°X, 2°X, 5°X, 35.25°X (AT), 42.75°X (ST)<br>22°Z, (for TTC cut)<br><br><u>Dopants</u><br>Quotes upon request<br><br><u>Properties Examined</u><br>Optical and piezoelectric<br><br><u>Applications</u><br>Electronic oscillators and filters, SAW<br>devices, narrow bandpass optical filters,<br>fiber optics | +<br><br><br>+<br>+                  |

| 158                                                                   |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Aslan Baghdadi, Richard Gurtler                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Motorola Inc., 5005 E. McDowell Road 85008           |         |                                        | A-110 Phoenix, Arizona Telephone: 602-244-5921                                                                       |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Silicon Ribbon                                                        | Z       | 0.1x75x∞                               | Large grained ribbon suitable for use as a<br>substrate for solar cells.                                             |                                      |

| 159                                                                            |         |                                        |                                                                                                                                    |                                      |
|--------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Wm. Ingle, S. W. Thompson, R. Chaney                                  |         |                                        |                                                                                                                                    |                                      |
| Inst. & Address: Motorola, Inc., 5005 E. McDowell Road, Phoenix, Arizona 85008 |         |                                        | Telephone: (602) 244-3127                                                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.               | Material<br>Avail-<br>ability<br>+ - |
| Amorphous or Polycrystalline silicon                                           | VP      | N.A.                                   | Low cost, high purity process for production of<br>solar silicon; Ingle U.S. Patent #4,070,444;<br>J.P.L./D.O.E. contract #954442. |                                      |

| <b>160</b><br>Name(s): H. Ming Liaw<br>Inst. & Address: Motorola Inc.<br>Semiconductor Research & Development Labs<br>5005 E. McDowell Road<br>Phoenix, Az 85008 U.S.A.<br>Telephone: (602)244-6328 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| Si Single Crystals                                                                                                                                                                                  | Cz      | 100x100x<br>650                        | Purity: $10^{15}$ atm/cc to $10^{19}$ atm/cc<br>Orientation: $\langle 100 \rangle$ $\langle 111 \rangle$<br>Dopants: B, P, As, Sb.<br>Properties Studies: Doping Uniformity<br>Crystalline Defects, Impurity Concentrations<br><br>Characterization: Chemical Etching, IR Ab-<br>sorption, X-ray Topographs, Spreading<br>Resistance, Diffusion Length, Diode Character-<br>istics<br><br>Applications: Semiconductor Devices<br><br>Publication: (1) "Phosphorus Donor Homogeni-<br>zation of Czochralski Crystals by Thermal<br>Neutron Irradiation Overdoping" Semicon-<br>ductor Silicon, Eds H.R. Huff & G. Sirtl,<br>Electrochem. Soc. p 116, (1977).<br>(2) "Influence of Heat Treatment of Silicon<br>Wafers on Infrared Absorption" to be published<br>on Tropical Conf. on Characterization Tech-<br>niques, Electrochem. Soc. 1978 | +                                    |

| <b>161</b><br>Name(s): Robert R. Rutherford<br>Inst. & Address: Motorola, Inc., PO Box 20932, Phoenix, AZ 85036<br>Telephone: 602-244-4133 |         |                                        |                                                                                                                                  |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.             | Material<br>Avail-<br>ability<br>+ - |
| Silicon                                                                                                                                    | CZ      | 51mm<br>76mm<br>100mm<br>125mm         | Crystal, Sawed Wafers, Etched<br>Wafers, Polished Wafers<br>111, 100 Orientations<br>P/Boron, N/Phosphorous, Arsenic, & Antimony | +                                    |
|                                                                                                                                            | G.E.    |                                        | Single Layers, Multiple Layers<br>Graded Layers Thickness From 2 to 100<br>Microns - Complete Resistivity Range                  | +                                    |

| <b>162</b><br>Name(s): J. G. Hust or R. E. Michaelis<br>Inst. & Address: National Bureau of Standards<br>Boulder, Colo 80303<br>National Bureau of Standards<br>Washington, D.C.<br>Telephone: 303-499-1000<br>x3733 |         |                                        |                                                                                                                                                                    |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                               | Material<br>Avail-<br>ability<br>+ - |
| High purity metals (platinum, gold<br>zinc, aluminum, copper) also numerous<br>physical property standard reference<br>materials                                                                                     | M       | wires,<br>blocks,<br>rods              | Purities generally about 99.999% or better<br>characterized by chemical composition, low<br>temperature electrical resistivity and thermo-<br>physical properties. | +                                    |

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Name(s): Leslie E. Smith

Inst. &amp; Address: Institute for Materials Research

Telephone: (301) 921-3321

National Bureau of Standards, Gaithersburg, MD 20234

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                          | Material<br>Avail-<br>ability<br>+                                                                 |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Polyethylene SRM 1482                                                 |         |                                        | Narrow molecular weight distribution linear polyethylene certified for weight and number average molecular weight, and limiting viscosity number. Weight average molecular weight is 13,600.  | Through office of Standard Reference Materials National Bureau of Standards, Washington, DC 20234. |
| Polyethylene SRM 1483                                                 |         |                                        | Narrow molecular weight distribution linear polyethylene certified for weight and number average molecular weight, and limiting viscosity number. Weight average molecular weight is 32,100.  |                                                                                                    |
| Polyethylene SRM 1484                                                 |         |                                        | Narrow molecular weight distribution linear polyethylene certified for weight and number average molecular weight, and limiting viscosity number. Weight average molecular weight is 119,600. |                                                                                                    |

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Name(s): Leslie E. Smith

Inst. &amp; Address: Institute for Materials Research

Telephone: (301) 921-3321

National Bureau of Standards, Gaithersburg, MD 20234

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                 | Material<br>Avail-<br>ability<br>+                                                                 |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Polystyrene Standard Reference Material (SRM) 705                     |         |                                        | Narrow molecular weight distribution polystyrene certified for weight and number average molecular weight and limiting viscosity number. Weight average molecular weight is 185,000. | Through Office of Standard Reference Materials National Bureau of Standards, Washington, DC 20234. |
| Polystyrene SRM 706                                                   |         |                                        | Broad molecular weight distribution polystyrene certified for weight and number average molecular weight and limiting viscosity number. Weight average molecular weight is 290,000.  |                                                                                                    |
| Polyethylene SRM 1475                                                 |         |                                        | Broad molecular weight distribution linear polyethylene certified for molecular weight distribution, melt flow and density. Weight average molecular weight is 52,000.               |                                                                                                    |
| Polyethylene SRM 1476                                                 |         |                                        | Branched polyethylene certified for limiting viscosity number, melt flow and density.                                                                                                |                                                                                                    |

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Name(s): W. Murray Bullis, Chief, Electron Devices Division

Inst. &amp; Address: National Bureau of Standards, Washington, DC 20234

Telephone: (301) 921-3786

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Semiconductor Device Grade Silicon                                    |         |                                        | <p>The Electron Devices Division develops and evaluates measurement methods, data, and associated technology for the characterization of electron devices and the materials, processes, and equipment used in their manufacture. Emphasis is on characterization of single-crystal silicon. Selected standard reference materials are under development. Results are announced in <i>Semiconductor Measurement Technology Progress Briefs</i> which can be obtained on request from the Division. Recent publications on silicon characterization methods include:</p> <p>Li, S. S., <i>Semiconductor Measurement Technology: The Dopant Density and Temperature Dependence of Electron Mobility and Resistivity in N-Type Silicon</i>, NBS Spec. Publ. 400-33 (March 1977).</p> <p>Buehler, M. G., and Thurber, W. R., Measurement of the Resistivity of a Thin Square Sample with a Square Four-Probe Array, <i>Solid-State Electronics</i> <u>20</u>, 403-406 (May 1977).</p> <p>Ehrstein, J. R., Effect of Specimen Preparation on the Calibration and Interpretation of Spreading Resistance Measurements, <i>Semiconductor Silicon/1977</i>, H. R. Huff and E. Sirtl, Eds., pp. 377-386 (Electrochemical Society, Princeton, NJ, May 1977).</p> |                                      |

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Name(s): W. Murray Bullis, Chief, Electron Devices Division

Inst. &amp; Address: National Bureau of Standards, Washington, D C 20234

Telephone: (301) 921-3786

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                                                                       |         |                                        | <p>Li, S. S., and Thurber, W. R., The Dopant Density and Temperature Dependence of Electron Mobility and Resistivity in n-Type Silicon, <i>Solid-State Electronics</i> <u>20</u>, 609-616 (July 1977).</p> <p>Mattis, R. L., and Buehler, M. G., A New Method for Calculating Background Dopant Density from p-n Junction Capacitance-Voltage Measurements, <i>J. Electrochem. Soc.</i> <u>124</u>, 1918-1923 (December 1977).</p> <p>Buehler, M. G., Dopant Profiles Determined from Enhancement Mode MOSFET D-C Measurements, <i>Appl. Phys. Letters</i> <u>31</u>, 848-850 (15 December 1977).</p> <p>Mayo, S., and Evans, W. H., Thermodynamic Considerations in the Use of Polysilicon Oxidation Tubes for Clean SiO<sub>2</sub> Films Preparation, <i>J. Electrochem. Soc.</i> <u>125</u>, 106-110 (January 1978).</p> <p>Thurber, W. R., and Buehler, M. G., <i>Semiconductor Measurement Technology: Microelectronic Test Pattern</i> NBS-4, NBS Spec. Publ. 400-32 (April 1978).</p> <p>Blackburn, D. L., Photovoltaic Technique for Measuring Resistivity Variations of High Resistivity Silicon Slices, <i>NBS J. Res.</i> <u>83</u>, 265-271 (May - June 1978).</p> |                                      |

| 167                                                                   |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): W. Murray Bullis, Chief, Electron Devices Division           |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| Inst. & Address: National Bureau of Standards, Washington, DC 20234   |         |                                        | Telephone: (301) 921-3786                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|                                                                       |         |                                        | <p>Koyama, R. Y., Detection of Deep Levels in High Power Semiconductor Materials and Devices, <i>NBS J. Res.</i> <b>83</b>, 273-281 (May - June 1978).</p> <p>Myers, D. R., and Phillips, W. E., Existence of an Isotope Shift for the Sulfur Deep Level in Silicon, <i>Appl. Phys. Letters</i> <b>32</b>, 756-758 (1 June 1978).</p> <p>Koyama, R. Y., Phillips, W. E., Myers, D. R., Liu, Y. M., and Dietrich, H. B., The Energy Levels and the Defect Signature of Sulfur-Implanted Silicon by ITCAP and TSC Measurements, <i>Solid-State Electronics</i> <b>21</b>, 953-955 (1978).</p> |                                      |

| 168                                                                    |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): David A. Ditmars                                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: National Bureau of Standards - Washington, D.C. 20234 |         |                                        | Telephone: 301-921-2786                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Tungsten                                                               | --      | --                                     | single crystal, 99.994% purity, random orientation, Heat capacity 300 - 2600 K                                       | -                                    |

| 169                                                                                          |         |                                        |                                                                                                                                                                                                            |                                      |
|----------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Dr. Masao Kuriyama                                                                  |         |                                        |                                                                                                                                                                                                            |                                      |
| Inst. & Address: National Bureau of Standards, Room A153, Bldg. 223, Washington, D. C. 20234 |         |                                        | Telephone: (301) 921-2986                                                                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                       | Material<br>Avail-<br>ability<br>+ - |
| Aluminum, Copper, Nickel                                                                     | Cz      | 100 mm,<br>25 mmφ                      | Characterized by x-ray double crystal topography (ACT). Dislocation densities are smaller than 2000 lines/cm <sup>2</sup> , for example, M. Kuriyama et. al., <i>J. Cryst. Growth</i> <b>43</b> (1978) 287 | 0+                                   |

| 170                                                                                         |               |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------|---------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): C. J. Eckhardt                                                                     |               |                                        |                                                                                                                      |                                      |
| Inst. & Address: Department of Chemistry, University of Nebraska-Lincoln, Lincoln, NE 68588 |               |                                        | Telephone: 402-472-2734                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                       | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Anthracene                                                                                  | Z             | 4 x 4 x 10                             | Piezoreflexion spectra studied                                                                                       |                                      |
| TCNQ                                                                                        | Sub-sol       | 1 x 4 x 4                              | Reflection spectroscopy                                                                                              | -                                    |
| Charge transfer complexes<br>(non-conducting)                                               | Sub-sol<br>VP | Varied                                 | Piezoreflexion spectra                                                                                               | -                                    |

| <b>171</b><br>Name(s): D. J. Sellmyer and R. D. Kirby<br>Inst. & Address: Department of Physics and Astronomy, University of Nebraska, Lincoln, NE 68588 Telephone: (402)472-2407 |           |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                             | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| HoGa <sub>2</sub>                                                                                                                                                                 | <u>Br</u> | 1 x 1 x 3                              | Resistance ratio = 120                                                                                               | +                                    |
| V <sub>5</sub> S <sub>8</sub>                                                                                                                                                     | <u>VP</u> | 2 x 3 x 4                              |                                                                                                                      | +                                    |
| V <sub>5</sub> Se <sub>8</sub>                                                                                                                                                    | <u>VP</u> | 2 x 3 x 4                              |                                                                                                                      | +                                    |
| NbSe <sub>3</sub>                                                                                                                                                                 | <u>VP</u> | 1 x 1 x 4                              |                                                                                                                      | +                                    |
| TiSe <sub>2</sub>                                                                                                                                                                 | <u>VP</u> | 1 x 5 x 5                              |                                                                                                                      | +                                    |
| NbSe <sub>2</sub>                                                                                                                                                                 | <u>VP</u> | 1 x 5 x 5                              |                                                                                                                      | +                                    |
| Zr <sub>40</sub> Cu <sub>60</sub>                                                                                                                                                 | <u>M</u>  | 1 x 10 x 10                            | splat cooled (amorphous)                                                                                             | +                                    |
| R <sub>65</sub> Co <sub>35</sub>                                                                                                                                                  | <u>M</u>  | 1 x 10 x 10                            | splat cooled, (amorphous) R = rare earth                                                                             | +                                    |

| <b>172</b><br>Name(s): H. M. Dess<br>Inst. & Address: NL Industries, Inc., Commercial Crystals Dept.<br>100 Chevalier Avenue, South Amboy, New Jersey 08879 Telephone: 201-679-7187 |         |                                        |                                                                                                                                                                                                                                               |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| SrTiO <sub>3</sub> - Strontium Titanate                                                                                                                                             | Ver     | 25 mm dia.<br>40-50 mm<br>long         | 99.95% SrTiO <sub>3</sub> , typical purity. Random orientation unless otherwise specified by customer. Crystals can be grown doped to order, best effort basis. Applications: optical components, dielectric material, solar energy research. |                                      |
| TiO <sub>2</sub> - Rutile                                                                                                                                                           | Ver     | 25 mm dia.<br>40-50 mm<br>long         | 99.95% TiO <sub>2</sub> , typical purity. C-axis approximately parallel to length. Crystals can be grown doped to order, best effort basis. Applications: optical components dielectric material, solar energy research.                      |                                      |
| Brochure available on request.                                                                                                                                                      |         |                                        |                                                                                                                                                                                                                                               |                                      |

| <b>173</b><br>Name(s): Dr. Ali Abul-Fadl<br>Inst. & Address: North Carolina A & T State University<br>Department of Electrical Engineering, Greensboro, N.C. 27411 Telephone: (919)379-7760 |                 |                                        |                                                                                                                                       |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                       | METHOD*         | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                  | Material<br>Avail-<br>ability<br>+ - |
| GaAs (single crystal)                                                                                                                                                                       | LPE             | 1.2X1.2 X<br>1-20 μm                   | 10 <sup>15</sup> -10 <sup>18</sup> (100), Si, Ge, Hall effect, resistivity                                                            | +                                    |
| GaAs (polycrystal)                                                                                                                                                                          | LPE &<br>CCLPE* | 1.2X1.2X<br>1-5μm                      | 10 <sup>16</sup> -10 <sup>18</sup> , undoped, Si, Ge, Hall effect, Resistivity; for low cost solar cells                              | +                                    |
| GaAlAs homojunction                                                                                                                                                                         | LPE             | 1.2 X1.2                               | 10 <sup>16</sup> -10 <sup>18</sup> (100), Si, Ge, Mg, Hall effect, Resistivity, photoluminescence, for high concentration solar cells | +                                    |
| * CCLPE-Current Controlled Liquid Phase Epitaxy                                                                                                                                             |                 |                                        |                                                                                                                                       |                                      |

| 174                                                                          |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): J. J. Blauzaki                                                      |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Dept. of Chemistry, State University<br>Raleigh, N.C. 27650 |         |                                        | Telephone: (919-737-2996)                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $\text{CBr}_4$ Carbon tetrabromide                                           | Sub.    | 3x.6x.6 cm                             | J. Crstal Growth 43,648(1978)                                                                                        |                                      |

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|-----------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Charles B. Childs                                                                                                              |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Department of Physics and Astronomy: University of North Carolina<br>at Chapel Hill; Chapel Hill, North Carolina 27514 |         |                                        | Telephone: (919) 933-5002                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Silver Bromide<br>Silver Chloride                                                                                                       | Br      | 20 x 20 x<br>200                       | Purity: less than $1 \times 10^{-6}$ mole fraction<br>cationic impurities.<br><br>Dopants: available.                | Yes<br><br>Yes                       |
| Silver Bromide<br>Silver Chloride                                                                                                       | Cz      | 20 x 300                               | Purity: less than $1 \times 10^{-6}$ mole fraction<br>cationic impurities<br><br>Dopants: available.                 | Yes<br><br>Yes                       |

| 176                                                                                                                           |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
|-------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Henn H. Soonpaa                                                                                                      |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| Inst. & Address: University of North Dakota, Physics Dept., Grand Forks, North Dakota 58202                                   |         |                                        | Telephone: 701-777-2911                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
| $\text{Bi}_{1-x}\text{Te}_x$ ; $\frac{1}{3} < x < \frac{1}{2}$ ;<br>Tetradymite;<br>x = 0.48<br><br>Bismuth Tellurium Sulfide | M       | 2x10x40                                | Thin crystals of x = 0.48 compound can be in intrinsic conductivity range. Bulk crystals are semi-metallic. Rhombohedral axis is perpendicular to the cleavage plane and the direction of growth. Have been used in studies of thermoelectric phenomena, quantum size effects, finite lattice effects, and two-dimensional transport phenomena.<br><br>1) D. Harker, Z. Kristallogr. 89 175 (1934)<br>2) H. H. Soonpaa, Technical Report No. 1940. Mechanical Division, General Mills, Inc. (1960) A D - 235354<br>3) A. C. Glatz, Am. Mineralogist 52, 161 (1967)<br>4) L. Pauling, Am. Mineralogist 60, 994 (1975)<br>5) K. R. Wilhelm and H. D. Bale, J. Phys. Chem. Solids 36, 624 (1975)<br>6) H. H. Soonpaa, in Physics of Semiconductors, Proc. of the 13th International Conference Rome, 1976. Edited by F. G. Fumi. North-Holland Publishing Co. Amsterdam and New York 1976. p. 364.<br>7) H. H. Soonpaa, Thin Crystal as a 2D system. Proc. of the 2nd International Conference on the Electronic Properties of 2D Systems. Berchtesgaden 1977. Edited by J. F. Koch and G. Landwehr. Schmitt and Meyer, Würzburg 1977. p. 128. | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)               | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------|----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| BaCu <sub>2</sub> O <sub>2</sub>                                                    | M        | Powder                                 | Preparation from Cu <sup>2+</sup> +Ba(OH) <sub>2</sub> for H <sub>2</sub> production cycles                          | -                                    |
| Cerium (III) Titanates                                                              | M or Sol | Powder                                 | Preparation for H <sub>2</sub> production cycles                                                                     | -                                    |
| Copper (II) Hydroxiodides                                                           | Sol      | Powder                                 | Preparation and identification (Inorg. Chim. Acta <u>27</u> , 275 (1978))                                            | -                                    |
| Lead (II-IV) Oxyiodides                                                             | M & Sol  | Powder                                 | Identification and chemical reactions<br>J. Inorg. Nucl. Chem. (in print)                                            | -                                    |
| Potassium Chromate (V) - K <sub>3</sub> CrO <sub>4</sub>                            | M        | Powder                                 | Preparation, Enthalpy of formation<br>Can. J. Chem. <u>56</u> , 446 (1978)                                           | -                                    |
| Strontium Chromate (IV), Sr <sub>2</sub> CrO <sub>4</sub>                           | M?       | Powder                                 | Preparation and reactions for H <sub>2</sub> production cycles                                                       | -                                    |
| Strontium Hydroxi Chromate (V), Sr <sub>5</sub> (CrO <sub>4</sub> ) <sub>3</sub> OH | M?       | Powder                                 | Preparation and reactions for H <sub>2</sub> production cycles. ChemTech., May, 330 (1976)                           | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KTaO <sub>3</sub>                                                     | Flu     | 20x10x10                               | Pure and doped with iron-group elements. Electronic and electromechanical properties are studied as well as the paramagnetic resonance of impurity ions. L. A. Boatner, Abdul-Hamid Kayal, and U. T. Höchli, Helv. Phys. Acta <u>50</u> , 167-169 (1977); U. T. Höchli and L. A. Boatner, J. Phys. C:Solid State Phys. <u>10</u> , 4319 (1977).                                  | +                                    |
| KTa <sub>1-x</sub> Nb <sub>x</sub> O <sub>3</sub>                     | Flu     | 10x10x10                               | Both pure and iron-doped crystals are grown. Quantum mechanical effects in ferroelectricity are investigated. U. T. Höchli, H. E. Weibel, and L. A. Boatner, Phys. Rev. Letters <u>39</u> , 1158 (1977); L. A. Boatner, U. T. Höchli, and H. E. Weibel, Helv. Phys. Acta <u>50</u> , 620 (1977). Photorefractive effects for optical data storage applications are also studied. | +                                    |
| K <sub>1-x</sub> Na <sub>x</sub> TaO <sub>3</sub>                     | Flu     | 8x8x8                                  | Ferroelectricity at low temperatures is being investigated. Possible applications include photoelectrochemical cell electrodes. L. A. Boatner and U. T. Höchli, Bull. Am. Phys. Soc. <u>23</u> , 197 (1978).                                                                                                                                                                     | +                                    |
| K <sub>1-x</sub> Li <sub>x</sub> TaO <sub>3</sub>                     | Flu     | 8x8x8                                  |                                                                                                                                                                                                                                                                                                                                                                                  | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MgO                                                                   | Arc<br>Fusion | 20x20x10                               | Both pure and doped single crystals are grown and a wide variety of studies have been performed using these materials (e.g. L. A. Boatner, R. W. Reynolds, M. M. Abraham, and Y. Chen, Phys. Rev. B-16, 86 (1977); M. M. Abraham, Y. Chen, L. A. Boatner, and R. W. Reynolds, Phys. Rev. Letters 37, 849 (1976). | Limited<br>(+)                       |
| CaO                                                                   | "             | 10x10x5                                |                                                                                                                                                                                                                                                                                                                  |                                      |
| SrO                                                                   | "             | 10x10x5                                |                                                                                                                                                                                                                                                                                                                  |                                      |
| Y <sub>2</sub> O <sub>3</sub>                                         | Arc<br>Fusion | 10x10x8                                | The growth process can be adapted to produce either stoichiometric or nonstoichiometric crystals.                                                                                                                                                                                                                | -                                    |
| CeO <sub>2</sub>                                                      | Arc<br>Fusion | 5x5x5                                  | The resulting material is generally highly reduced.                                                                                                                                                                                                                                                              | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)  | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                         | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------|---------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| WC                                                                     | Flu           | 2 x 2 x 1                              | A cobalt flux is employed.                                                                                                                                   | +                                    |
| SrCl <sub>2</sub>                                                      | Br            | 30x10x10                               | Doped with rare-earth, iron-group, and actinide impurities (e.g. L. A. Boatner, R. W. Reynolds, C. B. Finch, and M. M. Abraham, Phys. Rev. B-13, 953 (1976). | +                                    |
| PbS                                                                    | Br            | 4 x 4 x 4                              |                                                                                                                                                              |                                      |
| CsCl                                                                   | So1<br>Br     | 3 x 3 x 3<br>5 x 5 x 5                 |                                                                                                                                                              |                                      |
| WO <sub>3</sub> , MgO, MoO <sub>2</sub> , SiO <sub>2</sub> , ZnO, etc. | (Sub)<br>(VP) | 10 <sup>-4</sup>                       | Small oxide particle suspensions for light scattering investigations.                                                                                        | +                                    |

| 180 a                                                                                                            |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
|------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Yung-Kwang Chang                                                                                        |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Inst. & Address: Solid State Division, Oak Ridge National Laboratory, P. O. Box X,<br>Oak Ridge, Tennessee 37830 |         |                                        | Telephone: (615) 574-5496<br>FTS 624-5496                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
| Ti                                                                                                               | Z       | 10 dia. X 100                          | 1) In general, all starting materials were choices of best purity available commercially. Initial casting (arc and/or RF) was done under purified inert atmospheres (argon or helium). Frequently the starting materials were further purified by zone-melting with gas treatment (usually oxygen) or in a high vacuum ( $10^{-9}$ torr).<br><br>2) Many crystals were grown with seeded orientations.<br><br>3) Characterization techniques include chemical etching (for revealing grain boundaries and dislocations), x-ray Laue back reflection, x-ray topography, resistivity, vacuum fusion mass spectrometry, combustion-thermal conductivity and spark source mass spectrometry.<br><br>4) We have the capability to grow nearly all transition metals and many of their alloys and compounds. | Contact<br>Us                        |
| V                                                                                                                | "       | 11 " X 100                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Nb                                                                                                               | "       | 12 " X 200                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Ta                                                                                                               | "       | 9 " X 20                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Mo                                                                                                               | "       | 3 " X 150                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Ni                                                                                                               | "       | 10 " X 120                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Ir                                                                                                               | "       | 5 " X 30                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Pt                                                                                                               | "       | 6 " X 30                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Nb-Ta alloys (from 2.5 at.% to 33 at.% Ta) (2.5, 5, 7, 10, 15, 25, 33)                                           | "       | 6 " X 200                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Nb + 5 at.% Zr                                                                                                   | "       | 8 " X 70                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Nb-Mo alloys (5.4 wt.%, 10 at.% Mo)                                                                              | "       | 3 " X 100                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Mo-Re alloys (15, 20, 25, 92 at.% Re)                                                                            | "       | 4 " X 150                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Re + 8 at.% W                                                                                                    | "       | 5 " X 20                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
| Ti <sub>3</sub> Au                                                                                               | "       | 7 " X 12                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |

| 180 b                                                                                                            |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Yung-Kwang Chang                                                                                        |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Solid State Division, Oak Ridge National Laboratory, P. O. Box X,<br>Oak Ridge, Tennessee 37830 |         |                                        | Telephone: (615) 574-5496<br>FTS 624-5496                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ti <sub>3</sub> Pt                                                                                               | Z       | 3 mm grain                             |                                                                                                                      | Contact<br>Us                        |
| V <sub>3</sub> Si                                                                                                | "       | 5 mm grain                             |                                                                                                                      |                                      |
| Tb + 10 at.% Y                                                                                                   | Grain   | 3 X 3 X 4                              |                                                                                                                      |                                      |
| Tb + 50 at.% Y                                                                                                   | "       | 6 X 20 X 20                            |                                                                                                                      |                                      |
| Fe + 20 wt.% Ni + 15 wt.% Cr                                                                                     | "       | 3 X 3 X 20                             |                                                                                                                      |                                      |
| Fe + 3 wt.% Si                                                                                                   | "       | 7 X 25 X 30                            |                                                                                                                      |                                      |

| 181                                                                                                              |         |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
|------------------------------------------------------------------------------------------------------------------|---------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): G. W. Clark, C. B. Finch, and O. C. Kopp                                                                |         |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
| Inst. & Address: Metals and Ceramics Division, Oak Ridge National Laboratory<br>P. O. Box X, Oak Ridge, TN 37830 |         |                                | Telephone: (615) 574-4814<br>FTS 624-4814                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
| $\text{Eu}_2\text{O}_3$ , Europia                                                                                | Flu     | 0.2x0.2x5 mm                   | >99.99% pure single crystal for x-ray diffraction study [S. L. Bennett et al., <i>J. Cryst. Growth</i> 41, 309, (1977)]                                                                                                                                                                                                                                                                                                                                                                        | *                                    |
| $\text{Fe}_2\text{SiO}_4$ , Fayalite                                                                             | Cz      | 10mmφ x 15mm                   | >99.99% pure single crystal for geodynamic research [C. B. Finch et al., <i>Proc. 4th Amer. Conf. Crystal Growth</i> , 1978]                                                                                                                                                                                                                                                                                                                                                                   | *                                    |
| $\text{SiO}_2$ , Quartz                                                                                          | Hyd     | 10 x 20 x 7mm                  | Typically >99.9% pure $\text{SiO}_2$ ; major impurities: Al, Fe, Alkalies; grown on AT-cut seeds; doped with various alkalies and alkaline earths, boron; infrared spectroscopy, anelastic loss measurements; frequency control; O. C. Kopp and G. W. Clark, <i>J. Cryst. Growth</i> , V. 2, pp. 308-312, 1968; O. C. Kopp and P. A. Staats, <i>Jour. Phys. Chem. Solids</i> , V. 35, pp. 1029-1033, 1974; O. C. Kopp and P. A. Staats, <i>Jour. Phys. Chem. Solids</i> , V. 36, p. 356, 1975. | *<br><br>*limited                    |

| 182                                                                                                       |         |                                        |                                                                                                                                                           |                                      |
|-----------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): John W. Cleland                                                                                  |         |                                        |                                                                                                                                                           |                                      |
| Inst. & Address: Oak Ridge National Laboratory, Solid State Division, P. O. Box X,<br>Oak Ridge, TN 37830 |         |                                        | Telephone: (615) 574-5493<br>FTS 624-5493                                                                                                                 |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                      | Material<br>Avail-<br>ability<br>+ - |
| Semiconducting Elements and Compounds - Ge, Si, InSb, InAs, GaAs, etc.                                    |         | Ingot<br>slices                        | Defect-impurity interactions, radiation effects, neutron transmutation doping, electrical and optical properties, test device fabrication, photovoltaics. | +                                    |

| 183                                                                                                         |         |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): John D. Holder                                                                                     |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: ORNL, P.O. Box X, 4500S, A254, Oak Ridge, TN 37830                                         |         |                                        | Telephone: (615) 574-4816<br>FTS 624-4816                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $\text{Cr}_2\text{O}_3$ - Mo Eutectic                                                                       | Z       | 45x50x20                               | 99.9pure, directionally solidified, Mo as fibers                                                                     | +                                    |
| $\text{LaCrO}_3$ - Mo Eutectic                                                                              | Z       | 15x10x10                               | 99.9pure, directionally solidified, Mo as fibers                                                                     | +                                    |
| $(\text{Cr}, \text{Al})_2\text{O}_3$ - Mo Eutectic                                                          | Z       | 15x10x10                               | 99.9pure, directionally solidified, Mo as fibers                                                                     | -                                    |
| $\text{LaCrO}_3$ - W Eutectic                                                                               | M       | 5x5x5                                  | 99.9pure, cold crucible, W as fibers                                                                                 | -                                    |
| $\text{LaCrO}_3$ - Cr Eutectic                                                                              | M       | 5x5x5                                  | 99.9pure, cold crucible, Cr as fibers                                                                                | -                                    |
| $\text{YCrO}_3$ - Mo Eutectic                                                                               | M       | 5x5x5                                  | 99.9pure, cold crucible, Mo as fibers                                                                                | -                                    |
| $\text{YCrO}_3$ - W Eutectic                                                                                | M       | 5x5x5                                  | 99.9pure, cold crucible, W as fibers                                                                                 | -                                    |
| $\text{YCrO}_3$ - Cr Eutectic                                                                               | M       | 5x5x5                                  | 99.9pure, cold crucible, Cr as fibers                                                                                | -                                    |
| $\text{ZrO}_2(\text{Y}_2\text{O}_3)$ - $\text{Al}_2\text{O}_3(\text{Cr}_2\text{O}_3)$ - Mo Ternary Eutectic | Z       | 10x10x10                               | 99.9pure, directionally solidified, Mo as fibers                                                                     | +                                    |
| Pb-Sn-Cd Eutectic and alloys                                                                                | Z       | 2x2x50                                 | 99.999pure, directionally solidified, both two and three phase composites                                            | +                                    |

| 184                                                                          |         |                                        |                                                                                                                                                                                       |                                      |
|------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Edward Sonder                                                       |         |                                        |                                                                                                                                                                                       |                                      |
| Inst. & Address: Solid State Division, ORNL, P.O. Box X, Oak Ridge, TN 37830 |         |                                        | Telephone: (615) 574-6292<br>FTS 624-6292                                                                                                                                             |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                  | Material<br>Avail-<br>ability<br>+ - |
| MgO                                                                          |         | 12 x 12 x 3                            | Transport properties studied as a function of species, state, and amount of impurity using the following technique: electrical conductivity, thermopower, EPR, and optical absorption |                                      |
| MgAl <sub>2</sub> O <sub>4</sub>                                             |         | 12 x 5 x 1                             |                                                                                                                                                                                       |                                      |

| 185                                                                                                      |         |                                        |                                                                                                                                                                            |                                      |
|----------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Rosa T. Young                                                                                   |         |                                        |                                                                                                                                                                            |                                      |
| Inst. & Address: Solid State Division, Oak Ridge National Laboratory<br>P. O. Box X, Oak Ridge, TN 37830 |         |                                        | Telephone: (615) 574-5500<br>FTS 624-5500                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                       | Material<br>Avail-<br>ability<br>+ - |
| Si, Silicon                                                                                              | FZ,Cz   | diameter to 7 mm                       | n and p dopants for radiation damage, neutron transmutation doping and solar cell studies. Carrier concentration range from $\sim 10^{13}$ to $10^{17}$ cm <sup>-3</sup> . | +                                    |
| GaAs, Gallium Arsenide                                                                                   | Br      | .5 mm thick                            | Si doped. Carrier concentration $\sim 10^{18}$ cm <sup>-3</sup> for solar cell study.                                                                                      | +                                    |

| 186                                                                                |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                |                                      |
|------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): W.E. Bulman; M.J. Arnoff                                                  |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                |                                      |
| Inst. & Address: Ohio Semitronics Inc., 1205 Chesapeake Ave., Columbus, Ohio 43212 |         |                                        | Telephone: (614) 486-9561                                                                                                                                                                                                                                                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
| InAs - Indium Arsenide                                                             | Z       | 26x18x200                              | Polycrystalline - Hall coef. to 800 cm <sup>3</sup> /coul<br>Electrical characterization includes resistivity and mobility. Used for Hall Effect devices and infrared windows. Standard material is undoped, but has been produced with dopants such as Ag, Cr, Cu and Mn. Applications of the Hall Effect, Bulman W. E. Solid State Electronics Vol. 9, No. 5, Pages 361-372. | + -                                  |
| InSb - Indium Antimonide                                                           | Z       | 32x25x380                              | Polycrystalline - Carrier Concentration from $1 \times 10^{19}$ to $5 \times 10^{13}$ /cm <sup>3</sup> mobility to 10 <sup>6</sup> cm <sup>2</sup> /volt sec. Electrically characterized as to resistivity and mobility at 77°K. Used as infrared windows, Hall Effect devices and magnetoresistors. Material is available undoped or doped with Be, Cd, Mg and Zn.            | + -                                  |

| 187                                                                                 |         |                                                   |                                                                                                                                                                                                                                                                                |                                      |
|-------------------------------------------------------------------------------------|---------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): W. E. Bulman; M. J. Arnoff                                                 |         |                                                   |                                                                                                                                                                                                                                                                                |                                      |
| Inst. & Address: Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, Ohio 43212 |         |                                                   | Telephone: (614) 486-9561                                                                                                                                                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)            | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
| InSb - Indium Antimonide                                                            | Cz      | 32 O.D. x<br>125 L.                               | Single Crystal - Carrier Concentration<br>from $1 \times 10^{19}$ to $2 \times 10^{14}/\text{cm}^3$ . Electrical<br>characterization and dopants same as InSb-<br>Polycrystalline above. Standard orient-<br>ations are $[111]$ , $[211]$ , $[110]$ , others as re-<br>quired. | + -                                  |
| Bi <sub>2</sub> Te <sub>3</sub> - Bismuth Telluride                                 | Br      | 4 to 25 O.D.<br>250 L. and<br>25 x 25 x<br>250 L. | Polycrystalline - Thermoelectric grade<br>Electrical property characterization in-<br>cludes resistivity, seeback and figure of<br>merit.                                                                                                                                      | + -                                  |
| PbTe - Lead Telluride                                                               | Br      | 25 O.D. x<br>200L.                                | Polycrystalline - High purity optical<br>grade for evaporated coatings.                                                                                                                                                                                                        | + -                                  |
| GaSb - Gallium Antimonide                                                           | Z       | 25 x 18 x<br>150                                  | Polycrystalline - Undoped carrier concen-<br>tration to $1.3 \times 10^{16}/\text{cm}^3$ and mobility to<br>$3.0 \times 10^3 \text{ cm}^2/\text{volt sec.}$ at 77°K. Used in<br>making infrared windows and other devices.                                                     | +                                    |

| 188                                                                                     |            |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Joel J. Martin                                                                 |            |                                        |                                                                                                                      |                                      |
| Inst. & Address: Department of Physics, Oklahoma State University, Stillwater, OK 74074 |            |                                        | Telephone: 624-5799                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                   | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| KMgF <sub>3</sub> , RbMgF <sub>3</sub> ,                                                | Cz &<br>Br | 5 x 5 x 15                             | Fluoride perovskites are grown undoped and doped<br>with transition metals ore rare earths.                          | +                                    |
| Mn <sub>1-x</sub> Zn <sub>x</sub> F <sub>2</sub> ,                                      | Cz         |                                        | Properties studied include: optical, resonance,<br>thermal, and radiation damage.                                    | +                                    |
| Bi <sub>4</sub> Ge <sub>3</sub> O <sub>12</sub>                                         |            |                                        |                                                                                                                      |                                      |

| 189                                                                              |         |                                        |                                                                                                                                                                                                            |                                      |
|----------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): W.J. Fredericks                                                         |         |                                        |                                                                                                                                                                                                            |                                      |
| Inst. & Address: Department of Chemistry, Oregon State University, Corvallis, OR |         |                                        | Telephone: (503)-754-2191                                                                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                       | Material<br>Avail-<br>ability<br>+ - |
| NaCl Sodium Chloride                                                             | cz      | 25x25x85                               | All materials purified by ion exchange methods<br>and treated with reactive gases prior to melting<br>and while melted. Crystals usually pulled under<br>Ar atmosphere.<br><br>Various dopants as desired. | -                                    |
| KCl Potassium Chloride                                                           | cz      | 25x25x85                               |                                                                                                                                                                                                            | -                                    |
| KBr Potassium Bromide                                                            | cz      | 25x25x85                               |                                                                                                                                                                                                            | -                                    |
| SrF <sub>2</sub> Strontium Fluoride                                              | M       | 12 dia x 50                            | Diffusion conductivity dielectric relaxation,<br>optical absorption and luminescence measurements<br>made.                                                                                                 | -                                    |
| BaF <sub>2</sub> Barium Fluoride                                                 | M       | 12 dia x 50                            |                                                                                                                                                                                                            | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Organic Molecular Crystals and<br>Charge Transfer Complexes           | Br<br>Cz<br>Sol<br>Sub<br>VP<br>Z | mm to cms<br>on<br>edge                | Samples, pure or doped, oriented as required.<br>Research use in solid state physics and optical<br>spectroscopy     | occa-<br>sionally                    |

191

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cu <sub>3</sub> Au                                                    | B       | 10x10x5                                | 99.999% purity                                                                                                       | Small<br>quan-<br>tities             |

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Name(s): Donald L. Smith

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| (PbSn)Te and (PbSn)Se on BaF <sub>2</sub> (100)<br>substrate          | molec.<br>beam<br>epitaxy | 8X10<br>X.01                           | Bi and Tl-doped for diode lasers                                                                                     | possibly                             |
| GaAs                                                                  | "                         | "                                      | Be/SnTe-doped junctions and MOS structures for<br>solar cells                                                        | "                                    |
| (GaAl)N                                                               | RF-<br>activ.<br>evap.    | "                                      |                                                                                                                      | "                                    |

| <b>193</b><br>Name(s): M. Delfino<br>Inst. & Address: Philips Laboratories, 345 Scarborough Rd., Briarcliff Manor, New York 10510 Telephone: (914) 762-0300                                            |         |                                        |                                                                                                                       |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.  | Material<br>Avail-<br>ability<br>+ - |
| L(+) glutamic acid hydro-<br>chloride $\text{HOOC}(\text{CH}_2)_2\text{CH}(\text{NH}_2)\text{COOH}\cdot\text{HCl}$<br>and<br>$\text{DOOC}(\text{CH}_2)\text{CH}(\text{ND}_2)\text{COOD}\cdot\text{DC}$ | sol.    | 70x30x20                               | nonlinear optics<br>J. Crystal Growth <u>36</u> , 267-272 (1976).<br>J. Solid State Chem. <u>23</u> , 289-296 (1978). | +                                    |
| L(+) hydrazonium tartrate<br>$\text{H}_2\text{NNH}_2\cdot\text{HOOC}(\text{CHOH})_2\text{COOH}$<br>and<br>$\text{D}_2\text{NND}_2\cdot\text{DOOC}(\text{CHOD})_2\text{COOD}$                           | sol.    | 20x10x10                               | Nonlinear optics<br>J. Solid State Chem. <u>21</u> , 243-251 (1977)                                                   | +                                    |

| <b>194</b><br>Name(s): Dr. Brian J. Fitzpatrick<br>Inst. & Address: Philips Laboratories, 345 Scarborough Rd., Briarcliff Manor, N.Y. 10510 Telephone: (914) 762-0300 |                   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                 | METHOD*           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
| ZnSe                                                                                                                                                                  | LE,<br>VP,<br>Sol | 15x15x0.05                             | (111), all acceptor dopants, conductivity,<br>photoluminescence, TEM studies, for laser<br>and display applications;<br><br>Near Band Edge Luminescence in ZnSe Grown<br>from Gallium Solution, submitted to J.<br>Electrochem. Soc.<br><br>Optically Pumped Stimulated Emission in ZnSe<br>J. Quant. Electr., July 1978.<br><br>Electron Beam Induced Dislocation Climb<br>in ZnSe,<br>J. Appl. Phys., 1978 | +                                    |

| <b>195</b><br>Name(s): G. M. Loiacono<br>Inst. & Address: Philips Laboratories, Exploratory Research Dept.<br>345 Scarborough Rd., Briarcliff Manor, N.Y. 10510 Telephone: (914) 762-0300 ext. 458 |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $(\text{CH}_2\text{ND}_2\text{COOD})_3\cdot\text{D}_2\text{BeF}_4$<br>(DTGFB)                                                                                                                      | Sol.    | 60x60x60                               | Studies of thermal and electrical<br>properties. High purity. % D ~75%.                                              | +                                    |
| $\text{M}_3\text{B}_7\text{O}_{13}\cdot\text{X}$<br>(Boracites)                                                                                                                                    | Hyd.    | 1-5                                    | Studies of pyroelectric properties                                                                                   | -                                    |

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Telephone: 914-762-0300

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZnSe <sub>x</sub> S <sub>1-x</sub>                                    | M,VP    | 10x10x15                               | DOPANT: Al                                                                                                           | -                                    |
| M*P <sub>5</sub> O <sub>14</sub><br>(*RARE EARTHS)                    | FLU     | 12x25x30                               | FOR SOLID STATE MINI-LASERS                                                                                          | -                                    |

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Name(s): Andrew C. Lawson, Professor of Physics (Assistant)

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ex. 2945

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| intermetallic compounds                                               |         |                                        | usually polycrystalline                                                                                              | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ -                                                                    |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| NaI(Tl)                                                               | Kyrop*  | Ø16"x2"                                |                                                                                                                      | All<br>The<br>Crystals<br>Listed<br>in<br>this<br>form<br>are for<br>sale &<br>avail.<br>from<br>stock. |
| CsI(Tl)                                                               | Kyrop   | Ø16"x2"                                |                                                                                                                      |                                                                                                         |
| CsI(Na)                                                               | Kyrop   | Ø12"x2"                                |                                                                                                                      |                                                                                                         |
| NaCl                                                                  | Kyrop   | Ø400mmx80mm                            |                                                                                                                      |                                                                                                         |
| KCl                                                                   | Kyrop   | Ø350mmx100mm                           |                                                                                                                      |                                                                                                         |
| LiF                                                                   | Kyrop   | Ø100mmx165mm                           |                                                                                                                      |                                                                                                         |
| LiNbO <sub>3</sub>                                                    | Kyrop   | Ø50mmx50mm                             |                                                                                                                      |                                                                                                         |
| KBr                                                                   | Kyrop   | Ø350mmx100mm                           |                                                                                                                      |                                                                                                         |
| AgCl                                                                  | Br      | Ø100mmx100mm                           |                                                                                                                      |                                                                                                         |
| CsI                                                                   | Br      | Ø100mmx100mm                           |                                                                                                                      |                                                                                                         |
| KRS-5                                                                 | Br      | Ø100mmx100mm                           |                                                                                                                      |                                                                                                         |
| CsBr                                                                  | Br      | Ø100mmx100mm                           |                                                                                                                      |                                                                                                         |
| PET                                                                   | Sol     | 6"x4"x10mm                             |                                                                                                                      |                                                                                                         |
| EDdT                                                                  | Sol     | 5"x3"x10mm                             |                                                                                                                      |                                                                                                         |
| KAP                                                                   | Sol     | 8"x5"x10mm                             |                                                                                                                      |                                                                                                         |
| RbAP                                                                  | Sol     | 6"x4"x10mm                             |                                                                                                                      |                                                                                                         |
| NaAP                                                                  | Sol     | 3"x2"x10mm                             |                                                                                                                      |                                                                                                         |
| NH <sub>4</sub> AP                                                    | Sol     | 4"x3"x10mm                             |                                                                                                                      |                                                                                                         |
| TLAP                                                                  | Sol     | 4"x2"x10mm                             |                                                                                                                      |                                                                                                         |
| NaNO <sub>3</sub>                                                     | Sol     | 1"x1"x1"                               |                                                                                                                      |                                                                                                         |
| KDA                                                                   | Sol     | 15x15x15mm                             |                                                                                                                      |                                                                                                         |
| KDP                                                                   | Sol     | 5"x5"x5"                               |                                                                                                                      |                                                                                                         |
| DKDP                                                                  | Sol     | 2"x2"x2"                               |                                                                                                                      |                                                                                                         |
| TGS                                                                   | Sol     | 4"x2"x1.5"                             |                                                                                                                      |                                                                                                         |
| DTGS                                                                  | Sol     | 2"x2"x1.5"                             |                                                                                                                      |                                                                                                         |
| TGFB                                                                  | Sol     | 2"x2"x1.5"                             |                                                                                                                      |                                                                                                         |
| DTGFB                                                                 | Sol     | 1.5"x1.5"x1.5"                         |                                                                                                                      |                                                                                                         |
| TGS(Alanine)                                                          | Sol     | 4"x2"x1"                               |                                                                                                                      |                                                                                                         |

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PAGE 2

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Rochelle Salt                                                         | Sol     | 4"x4"x2"                               | The Last Dimension is along the Polar<br>Axis OY for all the crystals listed<br>on this page.                        |                                      |
| Alpha Iodic Acid                                                      | Sol     | 2"x2"x2"                               |                                                                                                                      |                                      |
| LiIO <sub>3</sub>                                                     | Sol     | 1"x1"x1"                               |                                                                                                                      |                                      |
| LiFormate                                                             | Sol     | 1/2"x1/2"x1/2"                         |                                                                                                                      |                                      |
| KPB                                                                   | Sol     | 1/2"x1/2"x1/2"                         |                                                                                                                      |                                      |

200

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NbO <sub>2</sub> Niobium dioxide                                      | Cz      | 5 x 5 x 5                              | Oriented along [001], [110]                                                                                          | -                                    |
| ZnF <sub>2</sub> Zinc fluoride                                        | M       | 8 x 8 x 8                              | Oriented same as above - Phys. Rev. B1,9, 4069(1977)                                                                 | -                                    |
| MgF <sub>2</sub> Magnesium fluoride                                   | M       | 13 x 13 x 13                           | Oriented for elastic constant determinations                                                                         | -                                    |
| NiF <sub>2</sub> Nickel fluoride                                      | M       | 6 x 6 x 6                              | Grown using self-sealing crucible                                                                                    | -                                    |
| Ti <sub>2</sub> O <sub>3</sub> Titanium sesquioxide                   | Cz      | 25 x 25 x 25                           | Also doped with vanadium                                                                                             | -                                    |
| a-As <sub>2</sub> S <sub>3</sub> amorphous arsenic trisulfide         | --      | 10 x 10 x 5                            | Used in ultrasonic studies                                                                                           | -                                    |
| a-As <sub>2</sub> Se <sub>3</sub> amorphous arsenic triselenide       | --      | 10 x 6 x 4                             | Used in ultrasonic studies                                                                                           | -                                    |
| TTF-TCNQ tetrathiofulvalene-tetracyanoquinodimethane                  | Sol.    | 3 x 1 x 0.1                            | Electrical conductivity studies                                                                                      | -                                    |

201

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                       | METHOD*                     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. V <sub>2</sub> O <sub>3</sub>                                                                                                                            | C <sub>z</sub><br>(tri-arc) | 4 dia x 20                             | Pure & doped                                                                                                         | +                                    |
| 2. Ti <sub>2</sub> O <sub>3</sub>                                                                                                                           | C <sub>z</sub>              | 15 dia x 20                            | Pure & doped                                                                                                         | -                                    |
| 3. NiO, CoO                                                                                                                                                 | arc transfer                | 4 dia x 30                             | Pure                                                                                                                 | -                                    |
| 4. Alkali halides                                                                                                                                           | Br                          | 380 dia x<br>1500                      | Pure & doped                                                                                                         | +                                    |
| 5. Fe <sub>3</sub> O <sub>4</sub> , magnetite                                                                                                               | skull<br>melter             | 20 x 20 x 20                           | Pure                                                                                                                 | +                                    |
| 6. (Fe <sub>3</sub> O <sub>4</sub> ) <sub>x</sub> · (Fe <sub>2</sub> TiO <sub>4</sub> ) <sub>1-x</sub><br>(0<x<.95) Magnetite-ulvöspinel<br>solid solutions | skull<br>melter             | 10 x 10 x 10                           |                                                                                                                      | -                                    |
| 7. HgS, cinnabar                                                                                                                                            | VP, Sol                     | 4 x 5 x 7                              | Pure                                                                                                                 | +                                    |
| 8. GaP                                                                                                                                                      | VP                          | 4 x 10 x 7                             | Pure                                                                                                                 | +                                    |
| 9. UO <sub>2</sub>                                                                                                                                          | VP                          | 3 x 5 x 17                             | Pure                                                                                                                 | +                                    |
| 10. V <sub>n</sub> O <sub>2n-1</sub>                                                                                                                        | VP                          | 2.5x2.5x20                             | Pure                                                                                                                 | -                                    |
| 11. TiS <sub>2</sub> , HfS <sub>2</sub>                                                                                                                     | VP                          | .5 x 20 x 20                           | Pure                                                                                                                 | +                                    |

202

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cadmium Telluride                                                     | Sol     | 20 X 20                                | Chlorine doped CdTe for nuclear detectors;<br>$10^9 \Omega \text{ cm}$ , good lifetimes and mobilities               | +                                    |

203

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Zinc Selenide, ZnSe, Raytran ZnSe                                     | CVD     | 800 x 800 x 25                         | Polycrystalline, high purity, well characterized.<br>Can also order as shaped component.                             | com-<br>mercial                      |
| Zinc Sulfide, ZnS, Raytran ZnS                                        | CVD     | 700 x 700 x 15                         | Polycrystalline, high purity, well characterized.<br>Can also order as shaped component.                             | com-<br>mercial                      |
| Calcium Fluoride, $\text{CaF}_2$                                      | M       | 200 dia x 25                           | Polycrystalline, high purity, well characterized.                                                                    | special<br>order                     |
| Boron Nitride, BN, H'BN                                               | CVD     | 150 x 80 x 8                           | Polycrystalline, isotropic, high purity, well<br>characterized.                                                      | com-<br>mercial                      |
| Magnesium Aluminate, $\text{MgAl}_2\text{O}_4$ ,<br>Spinel            | M       | 200 dia x 25                           | Polycrystalline, optical and mechanical properties<br>being studied.                                                 |                                      |

204

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Gallium Arsenide (GaAs)                                               | VPE     | 4 x 4 cm                               | High-purity single-crystal layers grown on<br><100> GaAs substrates. Wafers are character-<br>ized using normal C-V techniques plus Hall<br>measurements, etc. The VPE material is<br>grown to specifications for the fabrication of<br>the following devices:<br><br>FET's<br>Mixers<br>Guns<br>IMPATT's<br>Single-drift Reads<br>Double-drift Reads<br>Varactors | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| AlN                                                                   | VP      | 20x10x0.2                              | Optical bandgap, thermal expansion<br>J. Appl. Phys. <u>44</u> , 292 (1973); <u>45</u> , 1456 (1974).                  | -                                    |
| $\text{Bi}_{1-x}\text{Sb}_x$                                          | Z       | 20x10x100                              | Thermoelectric, thermomagnetic<br>"Crystal Growth", 187 (1967); Solid State Elect. <u>15</u> ,<br>1141 (1972).         | -                                    |
| ScAs, ScP                                                             | VP      | 20x10x0.1                              | Optical bandgap, electrical<br>J. Appl. Phys. <u>43</u> , 254 (1972).                                                  | -                                    |
| BeTe, BeSe, BeS                                                       | M, VP   | 5x3x0.3                                | Optical bandgap, electrical<br>J. Phys. Chem. Solids <u>33</u> , 501 (1972).                                           | -                                    |
| AlAs                                                                  | VP      | 2x10x0.1                               | Optical bandgap, luminescence<br>J. Appl. Phys. <u>42</u> , 2854 (1971); Solid State Commu.<br><u>8</u> , 1407 (1970). | -                                    |
| ZnSe, ZnS, CdSe, CdS                                                  | VP      | 20x10x0.2                              | Optical, electrical, doping<br>J. Electrochem. Soc. <u>119</u> , 381 (1972); <u>121</u> , 965<br>(1974).               | -                                    |
| $\text{ZnSc}_2\text{S}_4$ , $\text{CdSc}_2\text{S}_4$                 | VP      | 5x10x0.2                               | Optical, electrical, doping<br>J. Electrochem. Soc. <u>120</u> , 441 (1973).                                           | -                                    |
| ScN, LuN                                                              | VP      | 20x10x0.2                              | Optical, electrical, doping<br>RCA Rev. <u>31</u> , 680 (1970); J. Cryst. Growth <u>13/14</u> , 365<br>(1972).         | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                 | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $(\text{ZnSe})_{1-x}(\text{GaP})_x$                                    | VP, Sol | 20x10x0.2                              | Optical, electrical, doping<br>J. Appl. Phys. <u>40</u> , 2617 (1969); Appl. Phys. Lett.<br><u>16</u> , 366 (1970); RCA Rev. <u>31</u> , 662 (1970). | -                                    |
| $\text{Bi}_2\text{Te}_3\text{-Sb}_2\text{Te}_3\text{-Sb}_2\text{Se}_3$ | Br      | 10x5x50                                | Thermoelectric<br>J. Mater. Sci. <u>1</u> , 52 (1966); J. Electrochem. Soc.<br><u>115</u> , 556 (1968).                                              | -                                    |
| $\text{SrTiO}_3$ , $\text{CaTiO}_3$                                    | Flu     | 5x5x5                                  | Optical, electrical, luminescence<br>ECOM 0155-3, 0155-F Technical Reports (1971, 1972).                                                             | -                                    |
| Bi-MnBi                                                                | Z       | 10x10x70                               | Electrical<br>J. Appl. Phys. <u>38</u> , 5211 (1967).                                                                                                | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Direct, or crowded, ripening                                          |         |                                        | A possible effect in unsaturated solutions. If<br>two particles are close enough, single atoms may<br>transfer "directly" from the smaller to the larger<br>particle. See Dadyburjor and Ruckenstein,<br>J. Crystal Growth <u>38</u> , 285 (1977); Ruckenstein and<br>Dadyburjor, Thin Solid Films (1978) to be<br>published. |                                      |

212

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Gallium Arsenide                                                         | VI      | 1 cm x 1 cm<br>x 15 $\mu$ m            | Grown from trimethylgallium and arsine. $2 \times 10^{15}/\text{cm}^3$ (100), (111) sulfur, zinc, mobility carrier concentration, diffusion length, Schottky diodes, photo-voltaics, FET's.<br>J. Cryst. Growth, 26, 314 (1974); J. Electrochem. Soc., 122, 1378 (1975); J. Electrochem. Soc., 124, 1447 (1977); J. Electrochem. Soc., 125, 771 (1978). | -                                    |
| Indium Arsenide                                                          | VP      | 1 cm x 1 cm<br>x 5 $\mu$ m             | Grown from triethylindium and arsine on gallium arsenide substrates. $2 \times 10^{16}/\text{cm}^3$ , (100) mobility, carrier concentration.<br>J. Electrochem. Soc., 121, 1642 (1974); J. Electrochem Soc., 121, 1646 (1974).                                                                                                                          | -                                    |
| Gallium <sub>x</sub> Indium <sub>1-x</sub> Arsenide<br>$0 \leq x \leq 1$ | VP      | 1 cm x 1 cm<br>x 6 $\mu$ m             | Grown from trimethylgallium, triethylindium and arsine on gallium arsenide substrates (100), mobility, carrier concentration, energy gap, composition, carrier velocity, microwave FET's.<br>JECS, 122, 683 (1975); J. Appl. Phys., 46, 3941 (1975); J. Appl. Phys., 46, 4608 (1975).                                                                   | -                                    |
| Tin Oxide                                                                | VP      | 2 cm x 2 cm<br>x 1 $\mu$ m             | Grown from tetramethyltin and oxygen, both undoped and phosphorus doped (from phosphine) glass and silica substrates, annealed and unannealed, composition, conductivity, transmittance, solar cells.                                                                                                                                                   | -                                    |

CONTINUED ON NEXT PAGE

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tin Oxide (Cont.)                                                     |         |                                        | J. ECS, 123, 941 (1976); J. ECS, 124, 1060 (1977); Sol. State Electronics, 20, 773 (1977).                                                                                                                                                                                              |                                      |
| Silicon Dioxide                                                       | VP      | 2 cm x 2 cm<br>x 1 $\mu$ m             | From silane and oxygen, both $\text{SiO}_2$ and phosphosilicate glass (from phosphine). Kinetics of growth, composition, diffusion masks for gallium arsenide.<br>J. Appl. Phys., 44, 990 (1973); IEEE Trans. Elec. Dev., ED-19, 761 (1972); IEEE Trans. Elec. Dev., ED-21, 410 (1974). | -                                    |

214

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Succinonitrile $[\text{CN}(\text{CH}_2)_2\text{CN}]$                  | SUB Z   | 25 dia.<br>unlimited<br>length         | 99.9999+ % Random large crystals, B.C.C. plastic crystals at room temperature.                                       | +                                    |

215

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.           | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Beryllia, BeO, Beryllium Oxide                                        | Flux    | Up to<br>20 x 20 x 40                  | <200 ppm total impurities<br>Faceted bulk crystals with Wurtzite structure.<br>Properties described in many open publications. | By<br>Arrangement                    |

216

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. InGaAsP, Indium Gallium Arsenide Phosphide                         | LE      | 1cmx1.5cmx<br>40µm                     | Grown on InP substrate; <111>B and <100>; Te n-type dopant; Zn p-type dopant; Double Heterojunction Lasers; Ion Implanted Avalanche Photodiodes; LED                                               | -                                    |
| 2. GaAlSb, Gallium Aluminum Antimonide                                | LE      | 1cmx1.5cmx<br>400µm                    | Grown on GaSb substrate; <111>B and <100>; Te-n-type dopant; Ge-p-type dopant; Avalanche Photodiodes, Double Heterojunction Lasers                                                                 | -                                    |
| 3. GaAlAsSb, Gallium Aluminum Arsenide Antimonide                     | LE      | 1cmx1.5cmx<br>400µm                    | Grown on GaSb substrate; <100>; used to lattice match GaAlSb; maximum As in solid = 3.5%; Te-n-type dopant, Ge-p-type dopant; Avalanche Photodiodes; Double Heterojunction Lasers.                 | -                                    |
| 4. GaAlPSb, Gallium Aluminum Phosphide Antimonide                     | LE      | 1cmx1.5cmx<br>400µm                    | Grown on GaSb substrate; <100>; very low solubility in Ga; Not recommended.                                                                                                                        | -                                    |
| 5. GaAsSb, Gallium Arsenide Antimonide                                | LE      | 1cmx1.5cmx<br>400µm                    | Grown on GaAs substrate; <100>; Sn, Te-n-type dopants; Ge-p-type dopant; Multi-lattice matching layers required to reduce defect density; Avalanche Photodiodes; LED; Double Heterojunction Laser. | -                                    |
| 6. GaAlAsSb, Gallium Aluminum Arsenide Antimonide                     | LE      | 1cmx1.5cmx<br>600µm                    | Grown on GaAs substrate; <100>; Sn, Te n-type dopants; Ge-p-type Dopant; used as confining layers in GaAsSb alloys; Double Heterojunction Laser; LED                                               | -                                    |
| 7. GaAlAs, Gallium Aluminum Arsenide                                  | LE      | 1cmx1.5cmx<br>400µm                    | Grown on GaAs substrate; <100>, <111>B, Sn, Te-n-type dopants; Ge-p-type dopants; Double Heterojunction Laser; LED; Avalanche Photodiodes.                                                         | -                                    |
| 8. GaAs, Gallium Arsenide                                             | LE      | 1cmx1.5cmx<br>400µm                    | Same as 7.                                                                                                                                                                                         | -                                    |

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Telephone: (805) 498-4545

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                     | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| K <sub>2</sub> Pt(CN) <sub>4</sub> Br <sub>0.3</sub> ·3H <sub>2</sub> O*<br>Potassium tetracyanoplatinate<br>bromide (2:1:0.3) trihydrate              | EC      | ~ 10x1x1 mm                            | High purity, highly anisotropic, highly conducting (σ > 10 <sup>3</sup> ohm <sup>-1</sup> cm <sup>-1</sup> ) one-dimensional metal-like complexes. For a review article see J.S. Miller and A.J. Epstein, <i>Prog. Inorg. Chem.</i> , 20, 1 (1976). For preparative details see J.S. Miller, <i>Science</i> , 194, 189 (1976) and J.S. Miller, <i>Inorg. Synthesis</i> , 19, 000 (1978). | +                                    |
| K <sub>2</sub> Pt(CN) <sub>4</sub> C <sub>2</sub> O <sub>4</sub> ·3H <sub>2</sub> O*<br>Potassium tetracyanoplatinate<br>chloride (2:1:0.3) trihydrate | EC      | ~ 10x1x1 mm                            |                                                                                                                                                                                                                                                                                                                                                                                          | +                                    |
| K <sub>1.75</sub> Pt(CN) <sub>4</sub> ·1.5H <sub>2</sub> O*<br>Potassium tetracyanoplatinate<br>(1.75:1) sesquihydrate                                 | EC      | ~ 5x1x1 mm                             |                                                                                                                                                                                                                                                                                                                                                                                          | +                                    |
| K <sub>1.64</sub> Pt(O <sub>2</sub> C <sub>2</sub> O <sub>2</sub> )·2H <sub>2</sub> O*<br>Potassium bis(oxalato)platinate<br>(1.64:1) dihydrate        | EC      | ~ 1x0.05<br>x0.05 mm                   |                                                                                                                                                                                                                                                                                                                                                                                          | +                                    |
| *The deuterio analogues can also be prepared.                                                                                                          |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                          |                                      |

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Name(s): Wayne Anderson

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\*SUNY at Buffalo, Electrical Engineering, 4232 Ridge Lea Road, Amherst, NY 14226 \* 716/831-1835

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                             | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| polycrystalline silicon                                               | electron<br>beam<br>deposi-<br>tion |                                        | <110> orientation p-type, 1 $\Omega$ -cm crystallinity,<br>columnar structure, x-ray diffraction, SEM, TEM<br>applied to MIS solar cells | limited                              |

\*August 1978-August 1979

219

Name(s): Dr. Martha Greenblatt

Inst. &amp; Address: Department of Chemistry, Rutgers University, New Brunswick, N.J. 08903 Telephone: 201-932-3277

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Sr}_5(\text{PO}_4)_3\text{Cl}$ , $\text{Ba}_5(\text{PO}_4)_3\text{Cl}$<br>$\text{Cd}_5(\text{PO}_4)_3\text{Cl}$ | Flu     | 2x1x0.5                                | doped with Cr(V) for ESR study to detect<br>structural changes in the apatite struc-<br>ture.                        | +                                    |
| $\text{Li}_3\text{PO}_4$ , $\text{Li}_3\text{AsO}_4$                                                                   | Flu     | 3x4x1                                  |                                                                                                                      |                                      |
| $\text{Li}_3\text{VO}_4$                                                                                               | M       | 2x1x0.1                                | All samples were doped with small concen-<br>trations of Cr(V) to study electronic<br>structure by ESR.              |                                      |
| $\text{YPO}_4$ , $\text{YVO}_4$                                                                                        | Flu     |                                        |                                                                                                                      |                                      |
| $\text{K}_2\text{SO}_4$                                                                                                | Sol     | 3x2x0.5                                | doped with Mn(VI) for ESR study of the<br>electronic structure of $\text{MnO}_4^{2-}$                                |                                      |

220

Name(s): Dr. Lisa C. Klein

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Telephone: (201)932-2096

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| K feldspar- $\text{SiO}_2$                                            | M       | 1-5                                    | crystallization from eutectic melts                                                                                  |                                      |

221

Name(s): R.C. Folweiler

Inst. &amp; Address: Sanders Associates, Inc., 95 Canal Street, Nashua, N.H. 03061 Telephone: (603) 885-2828

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                    | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| LiYF <sub>4</sub> (YLF, Nd:YLF, $\alpha$ -B YLF)                          | Sol/Cz  | 35 dia.<br>150 long                    | 4 to 5 nines purity; doped with Nd, Tb, Ho,<br>Er, Tm, Yb and other rare earths; primarily<br>"a" axis; laser host and UV optical material;<br>some compositions stock. | +                                    |
| LiHoF <sub>4</sub>                                                        | Sol/Cz  | 30 dia.<br>100 long                    |                                                                                                                                                                         |                                      |
| HoF <sub>3</sub>                                                          | M/Cz    | 30 dia.<br>100 long                    |                                                                                                                                                                         |                                      |
| ErF <sub>3</sub>                                                          | Sol/Cz  | 30 dia.<br>100 long                    |                                                                                                                                                                         |                                      |
| K Tb <sub>3</sub> F <sub>10</sub>                                         | Sol/Cz  | 30 dia.<br>50 long                     | Cubic; Faraday rotator material with large<br>verdet constant; low n and n <sub>2</sub> .                                                                               | +                                    |
| BaTiO <sub>3</sub>                                                        | Sol/Cz  | 10x10x10                               | No flux contamination.                                                                                                                                                  | -                                    |
| SrTiO <sub>3</sub>                                                        | Sol/Cz  | 10x10x10                               | Low strain                                                                                                                                                              | -                                    |
| CaY <sub>2</sub> Mg <sub>2</sub> Ge <sub>3</sub> O <sub>12</sub> (CAMGAR) | Sol/Cz  | 30x30x20                               | Cubic; Nd doped (medium gain)                                                                                                                                           | -                                    |

222

Name(s): Arthur H. Lockwood

Inst. &amp; Address: Santa Barbara Research Center, 75 Coromar Drive, Goleta, CA 93017

Telephone: 805-968-3511

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| InGaSb                                                                | LE      | 40x32x.1                               | <111> B, electrical and optical properties, IR<br>detectors                                                          | - -                                  |
| InAsSb                                                                | LE      | 40 x 32 x .1                           | <111> B, electrical and optical properties, IR<br>detectors                                                          | - -                                  |
| HgCdTe                                                                | LE      | 25 x 25 x .1                           | <111>B, electrical and optical properties, IR<br>detectors                                                           | - -                                  |
| InSb                                                                  | LE      | 40 x 32 x.1                            | n-type, $2 \times 10^{14} \text{ cm}^{-3}$ , IR Detectors<br><111> B, electrical and optical properties              | - -                                  |

223

Name(s): D. R. Kinloch, Research Manager

Inst. & Address: Sawyer Research Products, a subsidiary of Brush Wellman Inc.  
35400 Lakeland Boulevard, Eastlake, Ohio 44094

Telephone: (216) 951-8770

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| SiO <sub>2</sub> , Quartz                                             | Hyd     | 300/160/100                            | Crystal produced commercially for<br>Piezoelectric and optical uses.                                                 | Yes                                  |

| <b>224</b><br>Name(s): T.F. Ciszek<br>Inst. & Address: Solar Energy Research Institute (SERI)<br>1536 Cole Blvd.<br>Golden, Colorado 80401<br>Telephone: (303) 234-7418 |         |                                        |                                                                                                                      |                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability:<br>+ - |
| Si Silicon                                                                                                                                                              | M       | 50x50x150                              | Crystallization techniques applicable to photo-voltaics are studied.                                                 | --                                    |

| <b>225</b><br>Name(s): Francis M. Uno<br>Inst. & Address: Spectrolab, Inc.; 12500 Gladstone Avenue, Sylmar, CA 91335<br>Telephone: 213 365-4611 |         |                                        |                                                                                                                                                                                                 |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                            | Material<br>Avail-<br>ability<br>+ - |
| Analysis of Effects of Impurities<br>Intentionally Incorporated into<br>Silicon                                                                 | CZ, FZ  | 20x20x0.20                             | Electrical Properties of Silicon Photovoltaic Cells<br>Deliberately Incorporated with 26 single, binary and<br>Ternary Compounds.<br><br>Final Report: JPL Contract 954694,<br>15 December 1977 | -                                    |

| <b>226</b><br>Name(s): Dr. Michael Kestigian<br>Inst. & Address: Sperry Research Center, Sudbury, MA 01776<br>Telephone: (617)369-4000 |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Gadolinium gallium garnet<br>( $Gd_3Ga_5O_{12}$ )                                                                                      | Cz      | 30mm dia.<br>150mm l                   | 6-nines purity<br>all major crystallographic orientations,<br>substrate material                                     |                                      |
| Samarium gallium garnet<br>$Sm_3Ga_5O_{12}$                                                                                            | Cz      | 30mm dia.<br>150mm l                   | Same as above                                                                                                        |                                      |
| Gadolinium scandium gallium garnet<br>$Gd_3Sc_2Ga_3O_{12}$                                                                             | Cz      | 30mm dia<br>150mm l                    | Same as above                                                                                                        |                                      |
| Gadolinium calcium zirconium<br>gallium garnet<br>$Gd_{(3-x)}Ca_{(x)}Ga_{(5-x)}Zr_{(x)}O_{12}$                                         | Cz      | 30mm dia<br>250mm l                    | Same as above                                                                                                        |                                      |
| Gadolinium magnesium<br>zirconium gallium garnet<br>$Gd_3Mg_{(x)}Zr_{(x)}Ga_{(5-2x)}O_{12}$                                            | Cz      | 30mm dia<br>150mm l                    | Same as above                                                                                                        |                                      |
| Samarium thulium gallium iron garnet                                                                                                   | IE      | 204mm x<br>30mm dia                    | Small-bubble-diameter cylindrical-domain magnetic<br>film wafers                                                     |                                      |
| Yttrium samarium thulium gallium<br>iron garnet                                                                                        | IE      | 204mm x<br>30mm dia                    | Same as above                                                                                                        |                                      |

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Name(s): M. Kestigian

Inst. &amp; Address: Sperry Research Center, Sudbury MA 01776

Telephone: (617)369-4000

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Yttrium samarium lutetium calcium<br>germanium iron garnet                                                                             | LE      | 20mm x<br>30mm dia                     | Same as above                                                                                                        |                                      |
| Combination of any rare earth cations<br>with either gallium, aluminum, or<br>germanium substitutions to control $\lambda_{\text{em}}$ |         |                                        |                                                                                                                      |                                      |
| Bismuth lutetium iron garnet                                                                                                           | LE      | 40mm x<br>30mm dia                     | Magneto-optic thin films                                                                                             |                                      |

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Name(s): Drs. V. K. Kapur, L. Nanis and A. Sanjurjo

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Telephone: (415) 326-6200

Ext. 2541

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Si Silicon                                                            | M, Sol,<br>VP, Cz | 100 $\mu\text{m}^3$                    | > 99.99% polycrystalline, p type, resistivity<br>0.2-0.5 ohm cm, low boron and phosphorus content<br>(100-200 ppb), solar cells; Quarterly reports 1<br>through 9 for the project, "Novel Duplex Vapor-<br>Electro-chemical Method for Silicon Solar Cells"<br>Contract No. DOE/JPL-954471 | +                                    |
| SiF <sub>4</sub> Silicon Tetrafluoride Gas                            | Sol, VP           | ---                                    | > 99.99% pure gas, inexpensive and abundantly<br>available source for silicon according to<br>$\text{SiF}_4 + 4\text{Na} \rightarrow \text{Si} + 4\text{NaF}$<br>$\Delta H_{298}^\circ = -166 \text{ Kcal/mole}$                                                                           | +                                    |
| Na <sub>2</sub> SiF <sub>6</sub> Sodium fluosilicate                  | Sol               | ---                                    | Convenient source for obtaining SiF <sub>4</sub> gas according<br>to $\text{Na}_2\text{SiF}_6 \xrightarrow{\Delta} 2\text{NaF} + \text{SiF}_4$                                                                                                                                             | +                                    |

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Name(s): A. L. Fahrenbruch, J. Aranovich

Inst. & Address: Department of Materials Science and Engineering, Stanford University,  
Stanford, CA 94305

Telephone: (415) 497-2951

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Zinc Oxide                                                            | SP*     | 10 x 10 x<br>$10^{-3} \text{ mm}^3$    | Films produced by * spray pyrolysis, $10^5 \text{ ohm-cm}$ as<br>sprayed without doping, resistivity reduced to<br>$10^{-2} \text{ ohm-cm}$ by heat-treatment in $\text{H}_2$ . Optical<br>transmission 80 to 90% corrected for reflection.<br>(111) axis perpendicular to substrate. Produced<br>solar cells on CdTe with about 4% solar efficiency.<br>See 13th IEEE Photovoltaic Specialists Conference<br>Volume, Washington, D.C., June 5, 1978. (Author,<br>A. Fahrenbruch). |                                      |

| <b>230</b><br>Name(s): Dr. Richard W. Vook<br>Inst. & Address: Syracuse University<br>409 Link Hall<br>Syracuse, N.Y. 13210<br>Telephone: 315-423-3466 |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Cu, Ag, Au                                                                                                                                             | VP      | 10<br>5<br>2x10 <sup>-4</sup>          | (001) and (111) orientation<br>(111) orientation is exceptionally smooth<br>RHEED, TEM                               | To order                             |

| <b>231</b><br>Name(s): Dr. Michael P. Rosynek<br>Inst. & Address: Dept. of Chemistry, Texas A & M University<br>College Station, Texas 77843<br>Telephone: (713)845-3552 |         |                                        |                                                                                                                                                                                    |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                               | Material<br>Avail-<br>ability<br>+ - |
| KC <sub>8</sub> , Potassium-Graphite Intercalate                                                                                                                         | M/SUB   | Powder                                 | Investigated behavior as a heterogeneous catalyst<br>for gas-phase hydrogenation of CO to hydrocarbon<br>products at one atmosphere pressure.                                      | +                                    |
| Iron-Graphite Intercalate (2.2 wt% Fe)                                                                                                                                   | SUB     | Powder                                 | "                                                                                                                                                                                  | +                                    |
| Cobalt-Graphite Intercalate (3.4 wt% Co)                                                                                                                                 | SUB     | Powder                                 | "                                                                                                                                                                                  | +                                    |
| La <sub>2</sub> O <sub>3</sub> , Lanthanum Sesquioxide                                                                                                                   | SOL     | Powder                                 | Investigated surface properties by infrared spec-<br>troscopy and catalytic behavior for double-bond<br>isomerization of alkenes and dehydration/dehydrog-<br>enation of alcohols. |                                      |

| <b>232</b><br>Name(s): D. R. Chopra<br>Inst. & Address: East Texas State University, Physics Dept, Commerce, Texas 75428 U.S.A.<br>Telephone: (214) 886-5488 |         |                                        |                                                                                                                                                                                                                                                                                       |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
| 1. Nickel                                                                                                                                                    |         | 15x15x0.5                              | 99.9% electropolished grade A polycrystalline foil<br>x-ray L-absorption & emission, Phys. Rev. A, 1,<br>230 (1970)                                                                                                                                                                   | +                                    |
| 2. Potassium Acid phthalate KAP                                                                                                                              |         | 50x50x10                               | 99.9% single crystals<br>x-ray spectrometric characteristics<br>Rev. Sci. Instr. 41, 1004, (1970).                                                                                                                                                                                    | -                                    |
| 3. Vanadium metal & oxides V <sub>2</sub> O <sub>3</sub> ,<br>V <sub>2</sub> O <sub>4</sub> , V <sub>2</sub> O <sub>5</sub>                                  |         | 10x5x0.002<br>powders                  | 99.9% polycrystalline foil<br>powder<br>x-ray K-spectral Absorption study of semiconductor-<br>to-metal transition, proceedings of 10th Symposium<br>on Nondestructive Evaluation, 230-242 (American<br>Society of Nondestructive Testing and Southwest<br>Research Institute, 1975). | -                                    |
| 4. Iron                                                                                                                                                      |         | 10x10x0.25                             | t4N polycrystalline foil (Ventron)<br>Electronic band structure                                                                                                                                                                                                                       | +                                    |
| 5. Stainless steel 316                                                                                                                                       |         | 10x10x2                                | polished and unpolished samples<br>corrosion studies<br>proceedings of 11th Symposium on Nondestructive<br>Evaluation, 31-37 (American Society of Nondestructive<br>Testing and Southwest Research Institute, 1977)                                                                   | +                                    |
| 6. Terbium                                                                                                                                                   |         | 10x10x0.62                             | m3N polycrystalline foil (Ventron)<br>Electronic band structure                                                                                                                                                                                                                       | +                                    |

| <b>233</b><br>Name(s): D. R. Chopra<br>Inst. & Address: East Texas State University, Physics Dept., Commerce, Texas 75428 U.S.A. Telephone: (214) 886-5488 |         |                                        |                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                         | Material<br>Avail-<br>ability<br>+ - |
| 7. Dysprosium                                                                                                                                              |         | 10x10x0.62                             | m3N polycrystalline foil (Ventron)<br>Electronic band structure<br>Rare Earth in Modern Science and Technology,<br>347-54 (Plenum Publishing Corporation, New York,<br>1978) | +                                    |
| 8. Holmium                                                                                                                                                 |         | 10x10x0.62                             | m3N polycrystalline foil (Ventron)<br>Electronic band structure<br>Phys. Rev. B, 14, 5231 (1976).                                                                            | +                                    |
| 9. Erbium                                                                                                                                                  |         | 10x10x0.75                             | 99.9% polycrystalline foil (Research Chemicals)<br>Electronic band structure                                                                                                 | +                                    |
| 10. Ytterbium                                                                                                                                              |         | 10x10x0.64                             | m3N polycrystalline foil (Ventron)<br>Electronic band structure                                                                                                              | +                                    |

| <b>234</b><br>Name(s): Glenn H. Sherman<br>Inst. & Address: II-VI Incorporated, Saxonburg Boulevard, Saxonburg, PA 16056 Telephone: 412-352-1504 |             |                                                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                            | METHOD*     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                 | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| CdTe, Cadmium Telluride                                                                                                                          | Br          | poly,<br>50mm dia.<br>60mm thick<br><br>single<br>15x15x45<br>25x25x25 | Optical, electrooptical, and nuclear<br>detector grades                                                              | Good                                 |
| ZnSe, Zinc Selenide                                                                                                                              | VP<br>(CVD) | 100x100x10                                                             | Polycrystalline, Optical grade                                                                                       | Good                                 |

| <b>235</b><br>Name(s): Tyco, Saphikon Division<br>Inst. & Address: 51 Powers Street, Milford New Hampshire 03055, U.S.A. Telephone: 603-673-5831 |            |                                           |                                                                                                                                                                                                  |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                            | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)    | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                             | Material<br>Avail-<br>ability<br>+ - |
| SAPPHIRE                                                                                                                                         | M<br>(FFG) | Filament:<br>0.25 MM Dia.<br>x 100 Meters | 1. Undoped.<br><br>2. Several orientations are routinely produced.<br><br>3. Applications:<br>Lids for FEPROM<br>Substrates (SOS any Hybird)<br>Medical Parts<br>Wear Parts<br>Other Custom Work |                                      |
|                                                                                                                                                  |            | Tube:<br>25 MM Dia.<br>x 50 CM            |                                                                                                                                                                                                  |                                      |
|                                                                                                                                                  |            | Ribbon:<br>75 MM x<br>3 MM x<br>150 CM    |                                                                                                                                                                                                  |                                      |
|                                                                                                                                                  |            | Special<br>Shapes                         |                                                                                                                                                                                                  |                                      |

| <b>236</b><br>Name(s): T. H. (Tom) Barker<br>Inst. & Address: Union Carbide Corp. Box 180 Sistersville, WV 26175<br>Telephone: (304) 652-3211 |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Trichlorosilane                                                                                                                               | VP      | Bulk,<br>18 ton/load                   | Boron < 0.3 ppbw parts per billion, weight<br>Phosphorus < 0.3 ppbw<br>Arsenic < 0.5 ppbw                            | +                                    |
| Dichlorosilane                                                                                                                                | VP      | Bulk<br>5 ton/load                     | Boron < 0.3 ppbw<br>Phosphorus < 0.3 ppbw<br>Arsenic < 0.5 ppbw                                                      |                                      |

| <b>237</b><br>Name(s): W. C. (Bill) Breneman, Dr. T.E. Childress<br>Inst. & Address: Union Carbide Corp. Box 180 Sistersville, WV 26175<br>Telephone: (304) 652-3211 |         |                                        |                                                                                                                                          |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                     | Material<br>Avail-<br>ability<br>+ - |
| Silane, SiH <sub>4</sub>                                                                                                                                             | VP      | 5 Kg                                   | Purity: 98 + %<br>Resistivity by silicon epitaxy: > 50 cm<br><br>Process Development research funded by DOE under<br>JPL Contract 954334 | -                                    |

| <b>238</b><br>Name(s): Dr. Hiroshi Morihara<br>Inst. & Address: Union Carbide Corp. 61 E. Park Dr. Tonawanda, N.Y. 14150<br>Telephone: (716) 877-1600 |         |                                        |                                                                                                                                                                  |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                             | Material<br>Avail-<br>ability<br>+ - |
| Silicon                                                                                                                                               | VLS     | Variable                               | Process design for large scale (1000 ton/yr.)<br>plant based on prep. of silane and pyrolysis<br>to silicon.<br>Research funded by DOE under JPL Contract 954334 | -                                    |

| <b>239</b><br>Name(s): Lawrence C. Greene<br>Inst. & Address: AFML/LPO, W-PAFB, Ohio 45433<br>Telephone: (513) 255-2334 |         |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Cadmium Sulfide                                                                                                         | VP      | platelets                              | undoped, doped with Na, Li, K, Rb, Ag                                                                                | +                                    |
| Cadmium Sulfide                                                                                                         | M       | boules 10x15<br>several<br>grains      | undoped, doped with Na, Li, K, Ag                                                                                    | +                                    |
| Cadmium Selenide                                                                                                        | VP      | platelets                              | undoped                                                                                                              | +                                    |
| Cadmium Selenide                                                                                                        | M       | boules 10x15<br>several<br>grains      | undoped                                                                                                              | +                                    |
| Zinc Selenide                                                                                                           | M       | boules 10x15<br>several<br>grains      | undoped, doped with Na, Li, K, Ag, Ag, Fe<br>107 109                                                                 | +                                    |
| Zinc Telluride                                                                                                          | M       | boules 10x15<br>several<br>grains      | undoped                                                                                                              | +                                    |

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Name(s): Elizabeth H. Tarrants

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Telephone: (513)255-2280/  
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| High Purity Silicon (Si)                                              | VAC<br>Z | 25 mm dia.<br>300 mm length            | Purity: $1-2 \times 10^{12}$ N <sub>B</sub><br>Orientation: (111)<br>Resistivity: 15,000 -30,000 ohm-cm<br>Type: P<br>Dislocations: Non-detectable<br>Applications: 1.06 micrometer detectors<br>Power Si devices<br><br>* Hughes Aircraft<br>Industrial Products Division<br>ATTN: W. J. Heinecke, Marketing Manager<br>6155 El Camino Real<br>Carlsbad, CA 92008<br>(714) 438-9191 | + *                                  |

241

Name(s): Dr. Scott Morrow, Dr. Jagadish Sharma

Inst. &amp; Address: ARRADCOM, Dover, N. J. 07801 ATTN: DRDAR-LCE

Telephone: 201-328-5490

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                    | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Single Crystals of 2,4,6<br>Trinitrotoluene (TNT) C <sub>7</sub> H <sub>5</sub> N <sub>3</sub> O <sub>6</sub> | Sol     | 20x10x5                                | Polarizing microscope studies and x-ray diffraction<br>confirm that the crystals are single (no twins).<br>Explosive properties are being investigated. | 20<br>Crystals                       |

242

Name(s): Dr. T. A. Richter

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Telephone: (201) 328-4914

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Inorganic Azides                                                      | Sol     | Best effort                            | Many inorganic azides have the property of<br>explosion. See: T. A. Richter, in: Energetic<br>Materials, Vol. 1, Physics and Chemistry of the<br>Inorganic Azides. (H.D. Fair and R.F. Walker,<br>ed.) New York, 1977 | +                                    |

243

Name(s): Dr. J. W. McCauley

Inst. & Address: Army Materials and Mechanics Research Center  
Watertown, MA 02172

Telephone: (617) 923-3463

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                 | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MICA/ALUMINA                                                          | Hot<br>Press-<br>ing    | 1" x 4"                                | Alumina based ceramic with 5-50 Vol % Ba-mica<br>(BaMg <sub>3</sub> Al <sub>2</sub> SiO <sub>10</sub> F <sub>2</sub> ) All properties; publications<br>available. | +                                    |
| Al <sub>23</sub> O <sub>27</sub> N <sub>5</sub> (ALON)                | Sinter-<br>ing<br>Vapor | 1/4" x 1/2"                            | Polycrystalline and single crystals of cubic<br>aluminum oxynitride spinel; some properties;<br>publications available.                                           | +                                    |

| <b>244</b><br>Name(s): Dennis J. Viechnicki<br>Jaroslav L. Caslavsky<br>Inst. & Address: U.S. Army Materials & Mechanics Research Center<br>Watertown, MA 02172<br>Telephone: (617) 923-3463<br>-3352 |         |                                        |                                                                                                                                                                                        |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                   | Material<br>Avail-<br>ability<br>+ - |
| $Y_3Al_5O_{12}$ (YAG)                                                                                                                                                                                 | M,HEM** | d = 76<br>h = 102                      | Impurities - 100 ppm<br>Orientation - [111], [100]<br>Dopant - Undoped or doped with Nd<br>Properties - Laser related<br>Characterization - XRD, optical, SEM<br>Applications - Lasers | +                                    |
| $YAlO_3$                                                                                                                                                                                              | M,HEM** | d = 50<br>h = 30                       | Same as above except for orientation which is [001]                                                                                                                                    | +                                    |
| ** HEAT EXCHANGER METHOD                                                                                                                                                                              |         |                                        |                                                                                                                                                                                        |                                      |

| <b>245</b><br>Name(s): CHARLES S. SAHAGIAN et al<br>Inst. & Address: DEPUTY FOR ELECTRONIC TECHNOLOGY<br>RADC/ESM, HANSCOM AFB, MA 01731<br>Telephone: (617) 861-4034 |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $KPb_2Nb_5O_{15}$ (PKN)                                                                                                                                               | Cz      | 2x2x2                                  | Surface acoustic wave applications                                                                                   | —                                    |
| InP (indium phosphide)                                                                                                                                                | Cz      | 100x20x20                              | - undoped and doped with Fe or Cr<br>- optoelectronic applications<br>- RADC technical report TR-77-398              | +                                    |
| $ZrO_2$ (zirconium dioxide)                                                                                                                                           | Cz      | 25x25x25                               | - cubic, stabilized with yttria.<br>- undoped and doped with Nd, Ni, etc                                             | +                                    |

| <b>246</b><br>Name(s): Hubert H. Caspers, D.<br>Inst. & Address: Naval Ocean Systems Center, Code 9222, San Diego, CA 92152<br>Telephone: (714) 225-6591 |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| InP                                                                                                                                                      | LE      | 10x10x1                                | Measurements to determine the optical properties of<br>bulk and layered structures.                                  | -                                    |
| $In_{1-y}Ga_yAs_xP_{1-x}$ /InP                                                                                                                           | LE      | thin films<br>on InP sub-<br>strate    | Measurements to determine the optical properties of<br>bulk and layered structures.                                  | -                                    |

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Name(s): Arthur R. Clawson

Inst. &amp; Address: Naval Ocean Systems Center, Code 9222, San Diego, CA 92152

Telephone: (714) 225-6591

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| InP                                                                   | LE      | $10^{-3} \times 7 \times 9$            | Preparation of submicron layers on {100} and {111}B InP:Fe substrates; for microwave MISFETs; Sn doping ( $10^{17} \text{cm}^{-3}$ ); thermal degradation studies of Fe-doped semi-insulating InP polished surfaces and its control with phosphorus overpressure using decomposition of $\text{PH}_3$ ; photoluminescence, transport properties. | -                                    |
| $\text{In}_{1-y}\text{Ga}_y\text{As}_x\text{P}_{1-x}$                 | LE      | $10^{-2} \times 7 \times 9$            | Preparation of layers lattice-matched to {100} and {111}B InP for IR detectors ( $\lambda \approx 1.0$ to $1.3 \mu\text{m}$ ); Sn doping ( $10^{17}$ to $10^{18} \text{cm}^{-3}$ ); Zn doping ( $10^{16}$ to $10^{18}$ ).                                                                                                                        | -                                    |
| GaAs                                                                  | LE      | $10^{-3} \times 7 \times 9$            | Preparation of submicron layers on {100} GaAs:Cr substrates for microwave FETs; Sn-doping ( $10^{17} \text{cm}^{-3}$ ); Ge doping ( $10^{16}$ to $10^{18} \text{cm}^{-3}$ ).                                                                                                                                                                     | -                                    |

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Name(s): H. Lessoff, P. Klein, J. Milstein and E. Swiggard

Inst. &amp; Address: Naval Research Laboratory, Code 5220, Washington, DC 20375 Telephone: 202-767-3096

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl Potassium Chloride                                                | Br      | 35 dia. x 200                          | IR abs. coef. as low as $10^{-5}$ high purity                                                                        | Direct Inquiry<br>(Research)         |
| KBr Potassium Bromide                                                 | Br      | 35 dia. x 200                          | " " " " " " " " " "                                                                                                  |                                      |
| NaCl Sodium Chloride                                                  | Br      | 25 dia. x 80                           | $\text{CCl}_4$ vapors used in growth                                                                                 |                                      |
| NaF Sodium Fluoride                                                   | Cz      | 20 dia. x 120                          | $\text{OH}^-$ conc. as low as 0.01 ppm                                                                               |                                      |
| LiF Lithium Fluoride                                                  | Cz      | 20 dia. x 120                          | " " " " " " " " " "                                                                                                  |                                      |
| $\text{Bi}_{12}\text{SiO}_{20}$ Bismuth Silicon Oxide                 | Cz      | 12 dia. x 50                           |                                                                                                                      | Inquiry<br>(Research)                |
| GaAs Gallium Arsenide                                                 | Cz      | 25 dia slices                          | Cr doped and undoped (approx. $10^{15} \text{cm}^{-3}$ ) semi-insulating, high purity bulk                           |                                      |
| InP Indium Phosphide                                                  | Cz      | 25 dia slices                          | Fe-doped and undoped, semi-insulating high purity bulk                                                               |                                      |
| $\text{RPO}_4$ Rare Earth Orthophosphate                              | Flu     | 3x3x10                                 |                                                                                                                      |                                      |
| Rare Earth Transition Metal Intermetallics                            | Cz      | 10x10x50                               |                                                                                                                      |                                      |
| $\text{NbO}_2$ Niobium Oxide                                          | Cz      | 10x10x20                               |                                                                                                                      |                                      |
| $\text{ZnGa}_2\text{O}_4$ Zinc and other gallates                     | Flu     | 5x5x5                                  |                                                                                                                      |                                      |

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Telephone: 394-2774

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GeTe (Germanium Telluride)                                            | M/Sub   | Films                                  | <p><u>Purity:</u> Starting Elements—99.9999%</p> <p><u>Properties Studied:</u> 1/f-Noise, Photoconductivity, Electrical Resistivity of the amorphous state.</p> <p><u>Application:</u> Infrared Detectors.</p> <p><u>Publications:</u></p> <p>1) The Specific Current Noise Power of Amorphous GeTe, J. of Non-Crystalline Solids, <u>23</u>, 435 (1977), K. P. Scharnhorst.</p> <p>2) 1/f-Noise in Amorphous GeTe, NSWC TR 76-97 (1976), K. P. Scharnhorst.</p> <p>3) The Noise Equivalent Power of the Amorphous GeTe/SiO Two Color Detector, NSWC TR 76-98(1976), K. P. Scharnhorst, D. Domske, G. Black.</p> <p>4) Exponential Photoconductive Edge in Amorphous GeTe, Infrared Physics, <u>14</u>, 139 (1974), H. R. Riedl, K. P. Scharnhorst, D. G. Simons.</p> <p>5) A 7-12 Micron Infrared Bolometer, Infrared Physics <u>13</u>, 77 (1973), H. R. Riedl, K. P. Scharnhorst.</p> <p>6) Effects of Annealing on the Electro-Optical Properties of Amorphous GeTe Films, NOLTR 72-196 (1972), K. P. Scharnhorst, H. R. Riedl.</p> |                                      |

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Name(s): K. P. Scharnhorst

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Telephone: 394-2774

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Ge}_x\text{Te}_{1-x}$                                                                  | M/Sub   | Films                                  | <p><u>Purity:</u> Starting Elements—99.9999%</p> <p><u>Properties Studied:</u> Photoconductivity, Electrical Resistivity of the Amorphous State.</p> <p><u>Applications:</u> Infrared Detectors.</p> <p><u>Publications:</u></p> <p>1) Photoconductivity in the Amorphous Ge-rich <math>\text{Ge}_x\text{Te}_{1-x}</math> System, J. Appl. Phys., <u>45</u>, 2971 (1974), K. P. Scharnhorst, H. R. Riedl.</p>                                                                                                                                                                                                         |                                      |
| $[(\text{Pb}_{0.8}\text{Sn}_{0.2})_x\text{Ge}_{1-x}]\text{Te}$ (Germanium Lead Tin Telluride) | M/Sub   | Films                                  | <p><u>Purity:</u> Starting Elements—99.9999%</p> <p><u>Properties:</u> Photoconductivity, Electrical Resistivity of the Amorphous State.</p> <p><u>Applications:</u> Infrared Detectors.</p> <p><u>Publications:</u></p> <p>1) Photoconductivity in Amorphous Ge-Pb-Sn-Te Alloys, Proceedings of the Special Meeting on Unconventional Detectors, IRIS Specialty Group, p. 113, University of Michigan, K. P. Scharnhorst, H. R. Riedl.</p> <p>2) Temperature and Intensity Dependence of Photoconductivity in Amorphous (GePbSn)Te Films, J. Appl. Phys. <u>43</u>, 5142 (1972), K. P. Scharnhorst, H. R. Riedl.</p> |                                      |

| <b>251</b><br>Name(s): K. P. Scharnhorst<br>Inst. & Address: Naval Surface Weapons Center, White Oak, Silver Spring, Maryland 20910 Telephone: 394-2774 |         |                                        |                                                                                                                                                                                                                                                         |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| (Pb <sub>1-x</sub> Sn <sub>x</sub> )Se (Lead Tin Selenide)                                                                                              | M/Sub   | Films                                  | Purity: Starting Elements—99.9999%<br>Properties Studied: Photoconductivity.<br>Application: Infrared Detectors.<br>Publications:<br>1) Epitaxial (Pb <sub>1-x</sub> Sn <sub>x</sub> )Se Films, NOLTR 70-233 (1970),<br>H. R. Riedl, K. P. Scharnhorst. |                                      |

| <b>252</b><br>Name(s): Richard Schoolar, James Jensen<br>Inst. & Address: Naval Surface Weapons Center, Silver Spring, MD 20910 Telephone: 202-394-2783 |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Pb <sub>x</sub> Cd <sub>1-x</sub> S    1 ≥ x ≥ .92                                                                                                      | Sub     | 15x15x.01                              | <111> n- and p-type, electrical, optical,<br>photovoltaic, ir detectors                                              | +                                    |
| PbS <sub>y</sub> Se <sub>1-y</sub> 1 ≥ y ≥ 0                                                                                                            | Sub     | 15x15x.01                              | <111> n- and p-type, electrical, optical,<br>photovoltaic, ir detectors                                              | +                                    |
| Pb <sub>2</sub> Sn <sub>1-z</sub> 1 ≥ z ≥ .90                                                                                                           | Sub     | 15x15x.01                              | <111> n- and p-type, electrical, optical,<br>photovoltaic, ir detectors                                              | +                                    |

| <b>253</b><br>Name(s): F. Rosenberger, with M.C. DeLong and G.F. Robertson<br>Inst. & Address: Crystal Growth Laboratory, 329 N-Physics University of Utah, Salt Lake City, Utah 84112 Telephone: (801) 581-8372 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ -                     |
| Bi <sub>4</sub> Ge <sub>3</sub> O <sub>12</sub>                                                                                                                                                                  | Cz      | 20ø x 30                               | Purity:<br>Crystals are grown from reagent grade and ultra-<br>pure starting materials. Synthesis from the<br>elements or further purification by zone re-<br>fining, vacuum sublimation and/or high temper-<br>ature chemical treatments, if required (Refs. 1-4)<br>Orientation:<br>Any desired orientation can be grown and/or cut.<br>Routinely cylinder axis (100)<br>Dopants:<br>Alkali metals (e.g. 800 ppm Li <sup>+</sup> in KCl)<br>alkaline earths, heavy metals, rare earths, OH <sup>-</sup> ,<br>OD <sup>-</sup> , CN <sup>-</sup> , etc. inquire.<br>Mixed crystals:<br>Alkali halides-alkali halides<br>Alkali cyanides-alkali halides<br>Dimensions:<br>Unless stated otherwise minimum: 25ø x 25 mm<br>maximum: 70ø x 50-60 mm<br>Characterization:<br>Laue diffraction<br>Chemical analysis by atomic absorption/<br>emission | All crystals listed are available.<br>Inquire for terms. |
| CdWO <sub>4</sub>                                                                                                                                                                                                | Cz      | 15ø x 25                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| CsBr                                                                                                                                                                                                             | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| CsCl                                                                                                                                                                                                             | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| CsF                                                                                                                                                                                                              | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| CsI                                                                                                                                                                                                              | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| HgI <sub>2</sub>                                                                                                                                                                                                 | VP      | ?                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KBr                                                                                                                                                                                                              | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KCl                                                                                                                                                                                                              | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KCN                                                                                                                                                                                                              | Z,Cz    |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KF                                                                                                                                                                                                               | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KMnF <sub>3</sub>                                                                                                                                                                                                | Cz      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| KI                                                                                                                                                                                                               | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| LiBr                                                                                                                                                                                                             | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| LiCl                                                                                                                                                                                                             | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| LiD                                                                                                                                                                                                              | Cz      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| LiF                                                                                                                                                                                                              | Cz,Br   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| LiH                                                                                                                                                                                                              | Cz      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
|                                                                                                                                                                                                                  |         |                                        | Contd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |

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F. Rosenberger, with M.C. DeLong and G.F. Robertson

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ -                     |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| LiI                                                                   | Cz, Br  | 15ø x 25                               | See also previous page                                                                                                                                                                                                                                                                                | All crystals listed are available.<br>Inquire for terms. |
| Mg                                                                    | VP, Br  |                                        | The melt grown alkali halides have dislocation densities (D) between $10^4$ - $10^7$ cm <sup>-2</sup> . Small samples (1 cm <sup>3</sup> ) with D < $10^6$ cm <sup>-2</sup> are grown from the vapor. (Ref. 5)                                                                                        |                                                          |
| NaBr                                                                  | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| NaCN                                                                  | Z, Cz   |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| NaF                                                                   | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| NaI                                                                   | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| RbAg <sub>4</sub> I <sub>5</sub>                                      | Cz      |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| RbBr                                                                  | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| RbCl                                                                  | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| RbF                                                                   | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| RbI                                                                   | Cz, Br  |                                        |                                                                                                                                                                                                                                                                                                       |                                                          |
| TiO <sub>2</sub>                                                      | VP      | 10 x 10 x 3                            | References:<br>1). Mat. Res. Bull <u>1</u> , 55 (1966).<br>2). Mat. Res. Bull <u>1</u> , 123 (1966).<br>3). <u>Crystal Growth</u> , H.S. Peiser ed. (Pergamon 1967) pp. 141-145.<br>4). <u>Ultrapurity</u> , M. Zief and R. Speights, eds. pp. 3-69.<br>5). J. Crystal Growth <u>43</u> , 148 (1978). |                                                          |
|                                                                       | M       | ?                                      |                                                                                                                                                                                                                                                                                                       |                                                          |

| <b>255</b><br>Name(s): Roger A. Castonguay<br>Inst. & Address: Varian/Lexington Vacuum Division<br>121 Hartwell Avenue, Lexington, MA 02173<br>Telephone: (617) 861-7200 |                  |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                    | METHOD*          | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Gallium Arsenide                                                                                                                                                         | CZ               | 37 mm Dia.<br>150 mm Long              | <111> Photocathodes, LED'S FET'S                                                                                     | +                                    |
| Lanthanum Hexaboride                                                                                                                                                     | Z                | 8 mm Dia.<br>100 mm Long               | <111> Cathodes                                                                                                       | +                                    |
| Gallium Phosphide                                                                                                                                                        | CZ               | 37 mm Dia.<br>75 mm Long               | <111> <100> LED'S                                                                                                    | +                                    |
| Gadolinium Gallium<br>Garnet GGG                                                                                                                                         | CZ               | 37 mm Dia.<br>150 mm Long              | <100> Bubble Domain Substrates                                                                                       | +                                    |
| Calcium Tungstate                                                                                                                                                        | CZ               | 37 mm Dia.<br>150 mm Long              | Neodymium Doped                                                                                                      |                                      |
| Calcium Fluoride                                                                                                                                                         | CZ               | 37 mm Dia.<br>150 mm Long              | Rare Earth Dopants                                                                                                   |                                      |
| Refractory Oxides                                                                                                                                                        | Skull<br>Melting |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ -     |
|--------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Copper with Alumina Dispersion<br>(Cu + Al <sub>2</sub> O <sub>3</sub> ) | PVD     | 100x100x2                              | OFBC copper and ultrapure sapphire were used. Equiaxed matrix with very fine (~40 Å) amorphous dispersion. Max. amount ~2 vol. %. Deposition parameters (substrate temp., deposition rate, surface roughness, amount of dispersoid, etc.) were investigated. Microhardness and room temperature tensile properties, and creep at elevated temperatures were studied. Fractography was done. Various characterization techniques employed. Excellent TEM photos show the fine dispersions.<br><br>Applications: High strength conductors at elevated temperatures.<br><br>Publications:<br><br>1) Thin Solid Films, <u>42</u> (1977) 327.<br>2) Thin Solid Films, <u>42</u> (1977) 343.<br>3) Thin Solid Films, <u>45</u> (1977) 527. | +<br>only<br>for<br>research<br>purposes |

257

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Lithium Fluoride, LiF                                                 |         | 9mm x 25 mm<br>diameter                | Doped with Mg, <10 to 600 ppm, shock experiments, propagation directions <100>, <110>, <111>; dynamic yield strength measurements. |                                      |

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Name(s): M. G. Fey, T. N. Meyer, W. H. Reed

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(412) 256-5214

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Polycrystalline, Solar Grade Silicon<br><br>Development of a Process for High Capacity-Arc Heater Production of Solar Grade Silicon via a high temperature, sodium reduction of silicon tetrachloride<br>$(4\text{Na} + \text{SiCl}_4 \rightarrow \text{Si}_{(s)} + 4\text{NaCl}_{(v)})$ |         |                                        | Expected silicon purity to be solar grade, silicon product will be collected in liquid phase, project sponsored by the Jet Propulsion Laboratory (JPL) for the U.S. Department of Energy.<br><br>Publications:<br><br>Project Quarterly Reports distributed by JPL<br><br>W. H. Reed, et al, "Development of a Process for High Capacity-Arc Heater Production of Silicon for Solar Arrays", <u>Proc. of IEEE Photovoltaic Specialists Conf.</u> , to be published late 1978. | Experi-<br>mental                    |

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|-------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): D. L. Barrett                                                                                |         |                                        |                                                                                                                                                                   |                                      |
| Inst. & Address: Westinghouse Research & Development Center<br>1310 Beulah Road, Pittsburgh, PA 15235 |         |                                        | Telephone: (412)256-3360                                                                                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                              | Material<br>Avail-<br>ability<br>+ - |
| GaAs - Gallium Arsenide                                                                               | Cz      | 60 diam.                               | Semi-insulating for microwave semiconductor application.                                                                                                          | -                                    |
| GaAs - Gallium Arsenide                                                                               | VP      | 25x.2x40                               | Epitaxial GaAs layers for microwave semiconductor application - undoped buffer layers, doped active layers, n <sup>+</sup> layers. Hall, CV and profile analysis. | -                                    |
| Si - Silicon Web                                                                                      | M       | 30x2x1200                              | Silicon web for large area semiconductor applications, optical and solar cell.                                                                                    | -                                    |
| SiC - Silicon Carbide                                                                                 | Sub     | 10x.5x10                               | SiC single crystal for semiconductor applications - high purity, polytype mobility, grown junction.                                                               | -                                    |

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|-------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): H. M. Hobgood, J. C. Swartz, R. N. Thomas                                                    |         |                                        |                                                                                                                                                                                     |                                      |
| Inst. & Address: Westinghouse Research & Development Center<br>1310 Beulah Road, Pittsburgh, PA 15235 |         |                                        | Telephone: (412)256-7588                                                                                                                                                            |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                | Material<br>Avail-<br>ability<br>+ - |
| Si, silicon                                                                                           | Cz, Z   | 50mm-75mm<br>dia.x40cm                 | 20-10,000 $\Omega$ -cm/<100>, <111>/boron, phosphorus (conventional, NTD), sulfur, selenium/photoconductivity/resistivity, i.r. absorption, Hall-effect/photoconductive devices.    | -                                    |
| Si:In, indium-doped silicon                                                                           | Cz, Z   | 30-75mm<br>dia.x40cm                   | 0.4-1 $\Omega$ -cm/<100>, <111>/indium, phosphorus (conventional and NTD)/photoconductivity/resistivity, i.r. absorption, variable temperature Hall effect/photoconductive devices. | -                                    |
| Si:Ga, gallium-doped silicon                                                                          | Cz, Z   | 30-75mm<br>dia.x40cm                   | 0.1-1.5 $\Omega$ -cm/<100>, <111>/gallium, phosphorus/photoconductivity/resistivity, i.r. absorption, variable temperature Hall-effect/photoconductive devices.                     | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): F. A. Shirland                                               |         |                                        |                                                                                                                         |                                      |
| Inst. & Address: Westinghouse R&D Center, Pittsburgh, PA 15235        |         |                                        | Telephone: (412) 256-3222                                                                                               |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.    | Material<br>Avail-<br>ability<br>+ - |
| Cadmium Sulfide                                                       | VP      | .03 x 150 x<br>150                     | +C oriented polycrystalline thin films for solar cells. Stoichiometrically doped, 1 to 10 ohm-cm, on various substrates | +<br>for<br>research                 |

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|----------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Arthur B. Ellis                                                                                             |         |                                        |                                                                                                                                                                                                          |                                      |
| Inst. & Address: Chemistry Department, University of Wisconsin-Madison,<br>1101 University Avenue, Madison, WI 53706 |         |                                        | Telephone: 608-262-0421                                                                                                                                                                                  |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                     | Material<br>Avail-<br>ability<br>+ - |
| CdS, CdSe, CdTe, GaP, GaAs,<br>InP, Si                                                                               |         | 10x10x1<br>typically                   | Use of commercially available materials in photoelectrochemical cells for the conversion of optical energy to electricity.<br><br>See J. Amer. Chem. Soc., 99, 2839, 2848 (1977) and references therein. |                                      |

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Name(s): Tu Chen

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)           | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MnSb Single Crystal                                                             | Cz      | 5x5x10                                 | Mn <sub>0.55</sub> Sb <sub>0.4</sub> to ~ MnSb (99.9% pure material),<br>nonstoichiometric                           | +                                    |
| Mn <sub>2</sub> Sb " "                                                          | "       | 10x10x20                               | " "                                                                                                                  | +                                    |
| NiSb " "                                                                        | "       | 10x10x10                               | " "                                                                                                                  | +                                    |
| CoSb " "                                                                        | "       | 10x10x10                               | " "                                                                                                                  | +                                    |
| AuSn " "                                                                        | Br      | 10x10x10                               | Good stoichiometry (>99.99% pure)                                                                                    | +                                    |
| CuSn " "                                                                        | "       | 2x5x10                                 | " "                                                                                                                  | +                                    |
| AuGa " "                                                                        | "       | 5x10x10                                | " "                                                                                                                  | +                                    |
| MnSb, NiSb and CoSb published on growth, structures<br>and physical properties. |         |                                        |                                                                                                                      |                                      |

264

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| layered dihalides: PbI <sub>2</sub> , CdI <sub>2</sub> , CdCl <sub>2</sub> ,<br>CdBr <sub>2</sub> , MgBr <sub>2</sub>                                                                         | Br      | 5 x 5 x 5                              | CdBr <sub>2</sub> , CdCl <sub>2</sub> , and MgBr <sub>2</sub> are hygroscopic and<br>are encapsulated in silica ampoules | +                                    |
| monohalides: InBr, InI                                                                                                                                                                        | Br      | 5 x 5 x 5                              |                                                                                                                          | +                                    |
| layered dichalcogenides: SnS <sub>2</sub> , SnSe <sub>2</sub>                                                                                                                                 | Br      | 8 x 5 x 5                              | several polytypes of SnS <sub>2</sub> ; phonon properties<br>studied                                                     | +                                    |
| layered monochalcogenides: GaS, GaSe                                                                                                                                                          | Br      | 8 x 5 x 3                              |                                                                                                                          | +                                    |
| NiAs-type: NiAs, NiS <sub>1+x</sub> , NiTe <sub>1+x</sub> ,<br>MnTe <sub>1+x</sub> , CoTe <sub>1+x</sub> , Ni <sub>1+x</sub> Sb, Co <sub>1+x</sub> Sb,<br>Cr <sub>1+x</sub> Sb                | Br      | 5 x 5 x 5                              | composition, lattice parameter, and reflectivity<br>measured                                                             | +                                    |
| chalcopyrite-type: AgGaSe <sub>2</sub> , AgGaS <sub>2</sub> ,<br>CuGaS <sub>2</sub> , CuGaSe <sub>2</sub> , AgGa(S <sub>x</sub> Se <sub>1-x</sub> ) <sub>2</sub> for<br>x = 0.3, 0.5, and 0.7 | Br      | 5 x 5 x 5<br><br>3 x 2 x 2             | optical and nonlinear optical properties                                                                                 | +                                    |
| SiAs, GeAs                                                                                                                                                                                    | Br      | 3 x 2 x 2                              | phonon properties studied                                                                                                | +                                    |
| Li <sub>2</sub> Ti <sub>3</sub> O <sub>7</sub>                                                                                                                                                | Br      | 5 x 3 x 3                              | Raman, optical properties, NMR, conductivity (AC)                                                                        |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Magnetic & non-magnetic garnet                                                                            | Flu.    | 3-5 m/m <sup>2</sup>                   | J. of Crystal Growth <u>24/25</u> , 1974. Random. Magnetic studies and IR tunable lasers.                            | + some                               |
| Rare earth-halides anhydrous RECl <sub>3</sub>                                                            | Br.     | 1-2 cm <sup>2</sup>                    | J. of Crystal Growth <u>6</u> , 1970<br>Magnetic studies.                                                            | + some                               |
| Rare earth-hydroxides RE(OH) <sub>3</sub>                                                                 | Hyd.    | 1-5 m/m long                           | J. of Crystal Growth <u>13/14</u> , 549-551, 1972.<br>C-axis along the crystal.                                      | + some                               |
| Rare earth-oxycarbonates                                                                                  | Hyd.    | 1-2 m/m <sup>2</sup>                   | Optical and structural studies.                                                                                      | -                                    |
| Bi <sub>12</sub> SiO <sub>20</sub>                                                                        | Cz.     | 1/2 cm x<br>10 cm.                     | J. of Crystal Growth <u>42</u> , 1977.<br>100 111<br>Electro-optical application.                                    | +                                    |
| K <sub>2</sub> PtCl <sub>6</sub>                                                                          | Sol.    | 3-5 m/m <sup>2</sup>                   | Low temperature phase transition studies.                                                                            | +                                    |
| K <sub>2</sub> OsCl <sub>6</sub>                                                                          | Sol.    | 3-5 m/m <sup>2</sup>                   |                                                                                                                      | +                                    |
| BaClF:Eu <sup>+2</sup>                                                                                    | Cz.     | 5 m/m x 50m/m                          | For tunable solid state lasers.                                                                                      | -                                    |
| BaCl <sub>2</sub> :Eu <sup>+2</sup>                                                                       | Br.     | 1 cm x 3 cm                            |                                                                                                                      | -                                    |
| CDP:Na <sub>3</sub> [Ce(C <sub>7</sub> H <sub>3</sub> NO <sub>4</sub> ) <sub>3</sub> ].15H <sub>2</sub> O | Sol.    | 5 m/m <sup>2</sup>                     | J. of Crystal Growth <u>16</u> , 1972.<br>Material for millikelvin thermometry                                       | +                                    |
| Ni and Ni Alloy: single crystal<br>Platelets                                                              | VP      | 3-4 m                                  | 110<br>Magnetic studies                                                                                              | -                                    |
| TaS <sub>2</sub> , TaSe <sub>2</sub> , NbS <sub>2</sub> , NbSe <sub>2</sub>                               | VP      | 0.1 m/m max.                           | Hexagonal platelets<br>Superconductivity measurements                                                                | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ca <sub>5</sub> (PO <sub>4</sub> ) <sub>3</sub> (OH) Hydroxyapatite   | Hyd     | 0.2x0.2x1.0                            | High purity, Studied: optical properties x-ray dif-<br>fraction characteristics phase diagram determination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0                                    |
| Ca <sub>2</sub> P <sub>2</sub> O <sub>7</sub>                         | Hyd     | 1.0x0.5x5.0                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | +                                    |
| CaHPO <sub>4</sub> Monetite                                           | Hyd     | 1.0x1.0x5.0                            | X-Ray Diffraction Analysis Techniques to Monitor Com-<br>position Fluctuations Within the Mineral Group:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | +                                    |
| CaHPO <sub>4</sub> .2H <sub>2</sub> O Brushite                        | Sol     | .01x3x5                                | Apatite. Applied Spectroscopy, 22:412-414, #5, Part<br>I, 1968.<br>Transition of Calcium Orthophosphate to Pyrophosphate<br>at Elevated Pressures. Mat. Res. Bull., 5:437-448,<br>1970.<br>Studies in the Basic Mineralizing System, CaO-P <sub>2</sub> O <sub>5</sub> -<br>H <sub>2</sub> O. Calc. Tiss. Res., 14:3-14, 1973.<br>Phase Relations in the CaO-P <sub>2</sub> O <sub>5</sub> -H <sub>2</sub> O System from 300-<br>600°C at 2 kb H <sub>2</sub> O Pressure. <sup>25</sup> Amer. J. Sci.,<br>273:545-560, Summer 1973.<br>Thermal Instability in Synthetic Hydroxyapatites.<br>J. of Physical Chemistry, 79:2017-2019, 1975. | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*         | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdTe-Cadmium telluride                                                | Sol. + <u>Z</u> | 50x10x10                               | 99.999 <sup>+</sup> , undoped. For nuclear radiation detectors                                                       | +                                    |
| CdTe-Cadmium telluride                                                | <u>Z</u>        | 30x10x10                               | 99.999 <sup>+</sup> , undoped. For solar cells                                                                       | -                                    |
| HgI <sub>2</sub> -Mercury Iodide                                      | <u>Sub</u>      | 10 x 5 x 3                             | Undoped. For nuclear radiation detectors                                                                             | -                                    |
| Si-Silicon epitaxial                                                  | <u>GE</u>       | 30x30x10 <sup>-3</sup>                 | Semiconductor grade. n and p doped. For semiconductor<br>devices                                                     | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| (AsO <sub>4</sub> ) <sub>2</sub> H <sub>2</sub> (UO <sub>2</sub> ) <sub>2</sub> · 8H <sub>2</sub> O<br>Hydrogen uranospinite | Sol.    | 2x2x0.5                                | <u>Publications:</u><br>- American Mineralogist <u>59</u> , 763, (1974)<br>- Ferroelectrics <u>9</u> , 241, (1975)<br>- " <u>17</u> , 469, (1978)<br><br>(Studies on dielectric, optical and thermal<br>behaviour). | Only in<br>small<br>quantities       |

269

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cu (copper)                                                           | EC      | 8x8x10                                 | <u>Purity:</u> 99.98% and 99.999%<br><u>Orientation of single crystals:</u> (100), (110), (111)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |
|                                                                       | Br      | 10x10x40                               | <u>Properties studied:</u><br>1. Habit and Structure of Electrodeposits<br>2. Epitaxial Growth by Electrodeposition<br>4. Polygonization<br><br><u>Publications:</u><br>1) J. Bebczuk de Cusminsky; Electrochim. Acta <u>15</u> , 73 (1970).<br>2) J. Bebczuk de Cusminsky and H. Wilman; Electrochim. Acta, <u>17</u> , 237 (1972).<br>3) J. Bebczuk de Cusminsky; Scripta Metall. <u>10</u> , 1071 (1976).<br>4) J. Bebczuk de Cusminsky; J. Cryst. Growth <u>41</u> , 330 (1977).<br>5) J. Bebczuk de Cusminsky and E. T. Niemela; J. Mat. Sci. <u>12</u> , 1492 (1977). |                                      |
| Ag (silver)                                                           | Br      | 10x10x40                               | <u>Purity:</u> 99.98% and 99.999%<br><u>Orientation:</u> (111)<br><u>Properties studied:</u> Polygonization<br><u>Publications:</u><br>J. Bebczuk de Cusminsky; Surface Technology <u>7</u> , 129 (1978).                                                                                                                                                                                                                                                                                                                                                                   |                                      |

270

Name(s): John S. Cook

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Alkali halides                                                        | Cz      | 25x25x100                              | High purity, cation and anion doped, dielectric absorption, electrical conductivity, hardness, UV and IR absorption and emission. Series of publications with Dryden, Meakins, Harvey and Heydon. | +                                    |

271

Name(s): S. MYHRA

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Brisbane

Telephone: 275-7271

| MATERIALS<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                     | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| InSb (n- and p-type)<br>Also high-purity.         |         |                                        | Electron radiation damage and the effect on transport properties at low temperatures (4K and 80K) including galvanomagnetic, thermo-electric and thermomagnetic effects. | -                                    |
| High-purity Zn (6 9's)                            |         |                                        | Electron radiation damage with electrical resistivity as monitor                                                                                                         | +                                    |

272

Name(s): Prof. R.L. Segall, Dr R.St.C. Smart and Dr P.S. Turner.

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Nickel oxide<br>Cobalt oxide                                          | VP      | Powders<br>0.1 - 1 $\mu$ m             | Characterisation of surfaces using infrared spectroscopy, scanning and transmission electron microscopy - dissolution kinetics (in acid solution) of semi-conducting oxides.<br><br>1. Semiconducting Oxides. Effect of Prior Annealing Temperature on Dissolution Kinetics of Nickel Oxide, J. Chem. Soc. Faraday I, 1977, 73, 1710.<br>2. Semiconducting Oxides. Effect of Electronic and Surface Structure on Dissolution Kinetics of Nickel Oxide, J. Chem. Soc. Faraday I, in press.<br>3. Semiconducting Oxides. Rate and Infrared Studies of Surface Blocking by Surfactants in Dissolution of Nickel Oxide, J. Chem. Soc. Faraday I, in press.<br>4. Semiconducting Oxides. Dissolution Kinetics of Cobaltous Oxide, to be submitted to J. Chem. Soc. Faraday I. | -                                    |
| Magnesium oxide                                                       | VP      | Powders<br>0.05-0.5 $\mu$ m            | Similar Methods - dissolution kinetics of ionic oxides.<br><br>1. Ionic Oxides. The Dissolution of Magnesium Oxide, submitted to J. Chem. Soc. Faraday I.<br>2. Growth Twinning in Magnesium Oxide Smoke Crystals, submitted to Phil. Mag. A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -                                    |

| <b>273</b><br>Name(s): A. R. BILLINGS, Y. C. MAK, N. PAZOLLI, A. BENN<br>Inst. & Address: Electrical & Electronic Engineering Department, University of Western Australia, Nedlands, Western Australia 6009 Telephone: 380-3105 380-3048 |           |                                        |                                                                                                                                                                                               |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                    | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                          | Material<br>Avail-<br>ability<br>+ - |
| Gallium Arsenide (and related ternary compounds)                                                                                                                                                                                         | MBE*      | 25x25x0.005                            | Epitaxial thin films being investigated with respect to infrared waveguides and integrated optics applications<br><br>*Molecular Beam Epitaxy                                                 |                                      |
| Titanium-diffused Lithium Niobate channel waveguides                                                                                                                                                                                     | diffusion | 25x10x1                                | Construction of Kogelnik-type thin film optical directional couplers for integrated optics applications<br><br>Orientation: y-cut & z-cut LiNbO <sub>3</sub> crystals<br><br>Dopant: Titanium |                                      |

| <b>274</b><br>Name(s): A. R. BILLINGS, Y. C. MAK, N. PAZOLLI, A. BENN<br>Inst. & Address: Electrical and Electronic Engineering Department University of Western Australia, Nedlands, Western Australia 6009 Telephone: 380-3105 380-3048 |                       |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                     | METHOD*               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
| Lithium Niobate (LiNbO <sub>3</sub> ) thin films deposited on Lithium Tantalate (LiTaO <sub>3</sub> ) substrate                                                                                                                           | Diode R.F. sputtering | 25x10x10 <sup>-5</sup>                 | Investigation of the effect of substrate temperature and sputtering gas on epitaxial growth of sputtered LiNbO <sub>3</sub> films on LiTaO <sub>3</sub> substrate has shown that transparent and chemically stable films were obtained when the substrate temperature was approximately 400°C and the Ar:O <sub>2</sub> ratio was 2:1. Higher substrate temperature and/or lower oxygen content produced brown films and decolourized the transparent LiTaO <sub>3</sub> substrate. Optical and waveguide properties of the LiNbO <sub>3</sub> -LiTaO <sub>3</sub> film structure are being studied. |                                      |

| <b>275</b><br>Name(s): A. R. BILLINGS, Y. C. MAK, N. PAZOLLI, A. BENN<br>Inst. & Address: Electrical and Electronic Engineering Department, University of Western Australia, Nedlands, Western Australia 6009 Telephone: 380-3105 380-3048 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
| Lithium Niobate (LiNbO <sub>3</sub> ) thin films deposited on optically polished vitreosil glass substrate                                                                                                                                 | Diode   | 25x10x10 <sup>-4</sup>                 | All freshly deposited LiNbO <sub>3</sub> films were transparent and extremely adherent. After exposure to air, white haze formed on all film surfaces. Results obtained from electron microprobe measurement showed definite Nb and O <sub>2</sub> elements. Li was too high to be detected by the probe. Film refractive index obtained from ellipsometer measurement was found to be below 2, less than those of bulk material. A rutile prism coupler and helium-neon laser of wavelength 6328 Å were used to study the waveguide properties of these films. No waveguide modes were coupled into the LiNbO <sub>3</sub> films. A bright short strip of light was observed terminating just outside the edge of the prism. It is considered that the poor waveguide performance of the LiNbO <sub>3</sub> films was due to undesirable crystalline structure of the film and mismatched boundary conditions between film and substrate surface. |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Silicon                                                               | MOS     | N.A.                                   | Material studies, minority carrier lifetime, capture cross section of generation impurities, and gettering of generation impurities by Ar <sup>+</sup> implant damage method.<br><br>Properties of silicon are studied by using non-equilibrium linear voltage ramp method. Materials are doped intentionally with gold, the lifetime of material and capture cross section of gold is measured, then gettering is carried out and various material parameters are related to the presence and absence of gold. | N.A.                                 |

276a

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| LiNbO <sub>3</sub> , lithium niobate                                  | Cz      | 50 x 20 dia                            | c or b axis orientation                                                                                              | +                                    |
| KH <sub>2</sub> PO <sub>4</sub> , potassium dihydrogen phosphate      | Sol.    | 30 x 30 x 60                           | c axis orientation, laser frequency doubling                                                                         | +                                    |
| NaNO <sub>3</sub> , sodium nitrate                                    | Cz      | 40 x 20 dia                            | c axis orientation, polarising prism studies                                                                         | +                                    |

277

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ag <sub>2</sub> Te                                                    | VP<br>(chem. trans-<br>port) | 4.5x1x1                                | The Laue photographs indicate that the material is in single crystal form.<br>Publications:<br>Compt. Rend. l'Acad. Bulg. Sci. 22, N2 (1969);<br>ibid. 25, N2 (1972).<br>Phys. Stat. Sol. (a) 47, K59 (1978).<br>O. Pavlov, thesis, Higher School of Chemical Technology and Engineering, 1977.                                                           | -                                    |
| Ag <sub>2</sub> Se                                                    | VP<br>(chem. trans-<br>port) | 1x1x0.5                                | X-ray rotating photographs indicate that the material is in single crystal form. Emission spectroscopy indicates that the material is contaminated with Cu, Ti, V.<br>N. Aramov, thesis, Higher School of Chemical Technology and Engineering, 1977.                                                                                                      | -                                    |
| Bi <sub>2</sub> (SeO <sub>4</sub> ) <sub>3</sub>                      | Gel growth                   | 5x3x2                                  | Electron diffraction indicates that the material is in single crystal form, rhombic system, d <sub>20</sub> = 3.92g/cc, parametric ratio a:b:c = 0.64:1.00:1.08. Emission spectroscopy of the Bi <sub>2</sub> (SeO <sub>4</sub> ) <sub>3</sub> and starting materials shows that the growth process is effective in improving the purity of the crystals. | -                                    |

| <b>278</b><br>Name(s): Dr. Z. Bancheva-Mladenova<br>Inst. & Address: Higher School of Chemical Technology and Engineering<br>Sofia-56, Darvenitza, Bulgaria Telephone: |               |                                        |                                                                                                                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                  | METHOD*       | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
| $\text{Ag}_2\text{SeO}_4$                                                                                                                                              | Gel<br>growth | 50x3x2                                 | X-ray rotating photographs and electron diffraction indicate that the material is in single crystal form. $\text{Ag}_2\text{SeO}_4$ crystals are successfully doped with Cu and Ni. The material is characterized by X-ray diffraction powder pattern and infrared spectrum. | -                                    |

| <b>279</b><br>Name(s): G.J.C. Carpenter and J.F. Watters<br>Inst. & Address: Atomic Energy of Canada Limited Chalk River Nuclear Labs. Telephone: (613) 584-3311<br>Chalk River, Ontario Canada KOJ 1J0 local 743/672 |         |                                        |                                                                                                                                             |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                        | Material<br>Avail-<br>ability<br>+ - |
| Zirconium                                                                                                                                                                                                             | Z       | 100<br><br>5<br><br>5                  | Iodide purity<br><br>Random orientation<br><br>Used mainly for studies of radiation-induced growth and creep, and of hydride precipitation. | On a<br>collabo-<br>rative<br>basis  |

| <b>280</b><br>Name(s): M.L. Swanson, A.F. Quenneville<br>Inst. & Address: Atomic Energy of Canada Limited, Chalk River Nuclear Laboratories Telephone: (613) 584-3311<br>Chalk River, Ontario KOJ 1J0 Canada |         |                                        |                                                                                                                            |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.       | Material<br>Avail-<br>ability<br>+ - |
| Al                                                                                                                                                                                                           | Br      | 13x12x70                               | 99.999% and dilute alloys containing 0.01-0.2 at% Mn, Cu, Zn, Ga, Ge, Ag, Sn.<br>Random orientation for channeling studies | +                                    |
| Cu                                                                                                                                                                                                           | Br      | 13x13x70                               | 99.999% and dilute alloys containing 0.1% Be, Ag, Sb, Au<br>Random orientation for channeling studies.                     | +                                    |
| Zn                                                                                                                                                                                                           | Br      | 13x13x70                               | 99.999%                                                                                                                    | +                                    |
| Au                                                                                                                                                                                                           | Br      | 10x10x40                               | 99.999%                                                                                                                    | +                                    |

| <b>281</b><br>Name(s): W.K. Unger, J.C. Irwin<br>Inst. & Address: Dept. of Physics, SFU, Burnaby, B.C., Canada Telephone: |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $\text{CdIn}_2\text{S}_4$                                                                                                 | VP      | 2x2x2                                  | Phys. Stat. Sol. (a) 46, 81 (1978)                                                                                   | -                                    |
| $\text{Zn}_x\text{In}_{2-x}\text{S}_4$                                                                                    | VP      |                                        | Solid State Commun. 25, 913 (1978)                                                                                   |                                      |

282

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl (Potassium Chloride)                                              | <u>C<sub>z</sub></u> | 20 × 20 × 20                           | Dopants - Divalent Elements<br>e.g. Ca <sup>2+</sup> , Eu <sup>2+</sup> , Sr <sup>2+</sup> .                                                                                                                                                                                                                                                                         | +                                    |
| NaCl (Sodium Chloride)                                                | <u>C<sub>z</sub></u> | 20 × 20 × 20                           | Electrical Properties<br>Dielectric Measurements<br>Ionic Thermal Currents<br><br>Publications:<br>1) Phys. Rev. <u>B 6</u> , 3973 (1972)<br>2) Phys. Rev. <u>B 10</u> , 3692 (1974)<br>3) J. Electrostatics (England) 1, 231 (1975)<br>4) Phys. Rev. <u>B 12</u> , 809 (1975)<br>5) Phys. Rev. <u>B 12</u> , 5997 (1975)<br>6) Phys. Rev. <u>B 15</u> , 4105 (1977) |                                      |

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(604) 364-4751

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) |          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------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| Al                                                                    | Aluminum | Z       | Not Restricted                         | 99.9999+%                                                                                                            | Resistivity Ratio >30,000,Single Crystal<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*             | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Hg Te                                                                 | Br                  | 15x5x5                                 | Transport properties                                                                                                 | n                                    |
| Hg Se                                                                 | Br                  | 15x5x5                                 | I.R. detectors                                                                                                       | n                                    |
| Hg Te <sub>x</sub> Se <sub>1-x</sub>                                  | Br                  | 15x5x5                                 |                                                                                                                      | n                                    |
| Hg S                                                                  | vP                  | 1                                      | Optical properties                                                                                                   | -                                    |
| Ga As                                                                 | Z                   | 48x22x300                              | Semi-insulating, Optoelectronics                                                                                     | p,n                                  |
| Si                                                                    | C <sub>z</sub> , vP | 50 O.D x 200                           | Solar cells                                                                                                          | p,n                                  |
| Ge                                                                    | C <sub>z</sub>      | 500(O.D.)x200                          | Discrete impurity band conduction<br>(under uniaxial stress)                                                         | p,n                                  |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdS <sub>x</sub> Se <sub>1-x</sub> , prep & stud.                     | Sub, GE | 10x10x10 <sup>-3</sup>                 | Films prepared under near-equilibrium conditions as part of heterojunction anodes for semiconductor-liquid-junction solar cells. | +                                    |
| GaP, GaAs <sub>0.6</sub> P <sub>0.4</sub> , GaAs, Cu <sub>2</sub> O   |         |                                        | Studied as electrodes in semiconductor liquid-junction solar cells.                                                              | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ice (H <sub>2</sub> O)                                                | Z       | 100 Diam<br>1000 Long                  | Very high purity as shown by dielectric measurements. Orientation as desired. Doped with HF, NH <sub>3</sub> . Also one D <sub>2</sub> O ice sample. Electrical and mechanical studies carried out. | On request.                          |

287

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tellurium                                                             | Cz      | 20 x 20 x100                           | Pulled from high purity melt<br><br>Sb - doped                                                                       | +<br>-                               |
| Selenium<br>hexagonal films                                           | GE      | 10 $\mu$ thick                         | undoped or Cl-doped<br>(1010) or (0001) orientations                                                                 | -                                    |
| Se-Te alloys                                                          | Cz      | -                                      | under study                                                                                                          | -                                    |

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Canada. L8S 4M1 Ext. 4563 & 2005

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                        | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| LiF (Mg)                                                                                     | Cz        | 25x25x50                               | Mg-DOPED <100> .225 mole %                                                                                           | -                                    |
| LiBO <sub>2</sub>                                                                            | Cz        | 5x10x15                                | (010) Raman & IR various isotopic substitution                                                                       | +                                    |
| Li <sub>2</sub> B <sub>4</sub> O <sub>7</sub>                                                | Cz        | 10x10x10                               | (102) Same as LiBO <sub>2</sub>                                                                                      | +                                    |
| LnTiO <sub>3</sub><br>Ln = Lanthanide                                                        | Cz, Br    | 5x3x2                                  | Magnetic, optical, electrical properties                                                                             | -                                    |
| Heusler alloys<br>NiMnSn <sub>2</sub><br>NiMn <sub>.8</sub> V <sub>1.2</sub> Sn <sub>2</sub> | Cz, Br    | 25x25x50                               | Neutron inelastic scattering                                                                                         | -                                    |
| CsMnBr <sub>3</sub><br>RbMnBr <sub>3</sub>                                                   | Cz, Br    | 10x20x25                               | Neutron elastic and inelastic scattering                                                                             | +                                    |
| CuO                                                                                          | V.P.      | 1x1x0.1                                | Neutron scattering                                                                                                   | -                                    |
| ReO <sub>3</sub>                                                                             | V.P.      | 2x2x0.5                                | DIVA (de Haas - van Alphen Effect)                                                                                   | -                                    |
| CdRbCl <sub>3</sub><br>KCdCl <sub>3</sub><br>KCdBr <sub>3</sub>                              | Cz,<br>Br | 5x5x5.<br>15 dia.x10                   | Raman scattering                                                                                                     | +                                    |
| NaNO <sub>2</sub>                                                                            | Cz        |                                        | NMR studies                                                                                                          | -                                    |
| LiNaV <sub>2</sub> O <sub>6</sub>                                                            |           | 1x1x5                                  | Structure & phase changes                                                                                            | -                                    |

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A1B 3X7

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NaNO <sub>3</sub> sodium nitrate                                                  | sol     | 3 x 3 x 3                              | Infrared and Raman studies have been performed on the single crystals. Normal modes of vibration have been assigned and phase transitions studied. Recent publications J. Chem. Phys. <u>68</u> , 67 (1978) | +                                    |
| KNO <sub>3</sub> potassium nitrate                                                | sol     | 6 x 4 x 2                              |                                                                                                                                                                                                             | +                                    |
| RbNO <sub>3</sub> rubidium nitrate                                                | sol     | 4 x 2 x 2                              |                                                                                                                                                                                                             | +                                    |
| CsNO <sub>3</sub> cesium nitrate                                                  | sol     | 4 x 2 x 2                              |                                                                                                                                                                                                             | +                                    |
| TlNO <sub>3</sub> thallium nitrate                                                | sol     | 2 x 2 x .5                             |                                                                                                                                                                                                             | +                                    |
| Sr(NO <sub>3</sub> ) <sub>2</sub> strontium nitrate                               | sol     | 4 x 4 x 2                              | J. Chem. Phys. <u>63</u> , 3054 (1975)                                                                                                                                                                      | +                                    |
| Pb(NO <sub>3</sub> ) <sub>2</sub> lead nitrate                                    | sol     | 4 x 4 x 4                              |                                                                                                                                                                                                             | +                                    |
| Ba(NO <sub>3</sub> ) <sub>2</sub> barium nitrate                                  | sol     | 2 x 2 x 2                              |                                                                                                                                                                                                             | +                                    |
| UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O Uranyl nitrate | sol     | 4 x 4 x 2                              |                                                                                                                                                                                                             | +                                    |
| Tl <sub>2</sub> CO <sub>3</sub> thallium carbonate                                | sol     | 6 x 2 x .5                             |                                                                                                                                                                                                             | +                                    |
| K <sub>2</sub> MgCl <sub>4</sub> potassium tetrachloromagnesium                   | M       | 2 x 1 x 1                              |                                                                                                                                                                                                             | +                                    |
| Cs <sub>2</sub> MgCl <sub>4</sub> cesium " "                                      | M       | 2 x 1 x 1                              |                                                                                                                                                                                                             | +                                    |
| Cs <sub>2</sub> MnCl <sub>4</sub> " tetra                                         | M       | 2 x 1 x 1                              |                                                                                                                                                                                                             | +                                    |
| Cs <sub>2</sub> ZnCl <sub>4</sub> " tetrachlorozincate                            | M       | 2 x 1 x 1                              |                                                                                                                                                                                                             | +                                    |
| CsMnCl <sub>3</sub> " trichloromanganese                                          | M       | 2 x 1 x 1                              |                                                                                                                                                                                                             | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Nickel                                                                | <u>Z</u> | 12 dia. x 1                            | (100), (111) and (112) Ni crystals of 99.997 wt.% purity. Characterized by electron and X-ray diffraction. Used in studies of the kinetics and mechanism of thin oxide film formation, and in studies of oxide film breakdown in aqueous environments. | +                                    |
| Iron                                                                  | <u>Z</u> | 12x5x1                                 | (112) Fe crystal of 99.997 wt.% purity. Characterized by electron and X-ray diffraction. Used in studies of the kinetics and mechanism of thin oxide film formation, and in studies of the structure of iron oxide films using Mössbauer spectroscopy. | +                                    |

291

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Telephone: 613-993-2514

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cu, Ag, Au, Mg, Zn, Cd, Al<br>sputtered and composite materials       | Br      | 10 x 2 x 70<br>50 diam                 | Monocrystalline and polycrystalline samples prepared from 69-grade starting materials for basic studies of electron motion in metals and alloys. Studies of Hall effect, magnetoresistance, magnetic properties. Dopants include low melting point metals and especially 3d group transition metals. |                                      |

292

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Alkali Halides:<br>NaBr, NaCl,<br>KCl, KBr, KI,<br>RbCl, RbBr, RbI    | Cz      | 15x15x75                               | Nominally pure, also doped with<br>alkaline earths and some anionic<br>impurities such as $O_2^-$ , $NO_3^-$ , $CO_3^{2-}$ ,<br>$OH^-$ . | +                                    |

293

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Telephone:

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                          | METHOD*                      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                            | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| AuAl <sub>2</sub> , AuGa <sub>2</sub> , AuIn <sub>2</sub> , AuSn, PtSn,<br>AuGa, Cu <sub>2</sub> Sb, AuPb <sub>2</sub> , CuZn, AgZn, InPd,<br>MgTl, HgMg, YZn, AuMg, AgMg, Al <sub>2</sub> Cu,<br>NiSi, PdTe <sub>2</sub> , Pt <sub>3</sub> Sn | Br<br>quench-<br>anneal<br>M | a few mm<br>typically<br>2x2x6         | de Haas-van Alphen effect and Fermi surface of<br>intermetallic compounds, samples usually not<br>available, information on preparation available                                                                               | -                                    |
| Cu, Ag, Au.                                                                                                                                                                                                                                    | Br                           | Boyle<br>10 diam<br>x30 long           | Pure metals and single xtal dilute alloys to ~1%<br>with homovalent, heterovalent & transition metal<br>solutes. de Haas-van Alphen studies: Fermi<br>surface and electron scattering. Small samples<br>occasionally available. | -                                    |
| Cu, Ag, Au, Pt, Cu-Au, Ag-Au, CuPt                                                                                                                                                                                                             | M                            | 25x25x25                               | Polycrystalline pure metals and alloys. Ordering.<br>Specific heat 0.4-30K studied.                                                                                                                                             | -                                    |

294

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cadmium                                                               |         | 11 x 5 x 1½                            | RRR 4-9 x 104 C-axis perp. to length<br>Magnetotransport<br>R.J. Douglas & R. Fletcher, Phil. Mag. <u>32</u> , 73-81<br>(1975).                                                                                    | +                                    |
| Lead                                                                  | M       | 25 x 8 x 1½                            | R. Fletcher, J. Low Temp. Phys. <u>22</u> , 39-59 (1976).<br>RRR ~ 10 <sup>5</sup> cubic axis perp. to length<br>Magnetotransport<br>R. Fletcher & M.R. Stinson, J. Low Temp. Phys. <u>27</u> ,<br>787-800 (1977). | +                                    |
| Tungsten                                                              |         | 12 x 5 x 1½                            | RRR ~ 3 x 10 <sup>4</sup> cubic axis perp. to length<br>Magnetotransport<br>R.J. Douglas & R. Fletcher, Phil. Mag. <u>32</u> , 73-81<br>(1975).                                                                    | +                                    |
| Indium                                                                | M       | 70 x 3.6 x 1                           | R. Fletcher, Phil. Mag. <u>32</u> , 565-76 (1975).<br>RRR ~ 10 <sup>5</sup> cubic axis perp. to length<br>Magnetotransport<br>B.J. Thaler & R. Fletcher, J. Low Temp. Phys. <u>30</u> ,<br>773-97 (1978).          | -                                    |
| Molybdenum                                                            |         | 12 x 5 x 1½                            | RRR ~ 6000 cubic axis perp. to length<br>Magnetotransport<br>R. Fletcher, Phy. Rev. <u>B14</u> , 4329-37 (1976).<br>R. Fletcher, J.L. Opsal & B.J. Thaler, J. Phys. (F)<br><u>7</u> , 1489-96 (1977).              | +                                    |

295

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613-547-5877

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Metals and Alloys                                                     | M, Z<br>Cz, Br | 2.5x2.5x<br>20.0 cm.                   | 99.9999 + controlled orientations<br>B.C.C. alloys,<br>Li-Mg<br>Cu-Zn and its analogues, electronic structure via<br>positron annihilation techniques.<br><br>Eutectic alloys morphological characterisation,<br>mechanical properties, electro-magnetic properties. | +<br><br>+<br><br>+                  |

296

Name(s): Professor F.W. Boswell

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Cu}_x\text{NbS}_2$ ( $x \leq 0.50$ )                           | VP      | 6x6x0.1                                | Thin flakes. F.W. Boswell, A. Prodan and J.M.<br>Corbett, Phys. Stat. Sol. (a) <u>35</u> , 591 (1976)                  | -                                    |
| $\text{Fe}_x\text{NbS}_2$ ( $x \leq 0.50$ )                           | VP      | 5x5x0.1                                | Thin flakes. F.W. Boswell, A. Prodan, W.R. Vaughan<br>and J.M. Corbett, Phys. Stat. Sol. (a) <u>45</u> , 469<br>(1978) | -                                    |
| $\text{Mn}_{.25}\text{NbS}_2$                                         | VP      | 5x5x0.1                                | Thin flakes. F.W. Boswell, W.R. Vaughan and J.M.<br>Corbett, J. Sol. State Chem. <u>24</u> , 115 (1978).               | -                                    |
| $\text{Cu}_x\text{ZrS}_2$ ( $x \leq 0.45$ )                           | VP      | 3x3x0.05                               | Thin flakes.                                                                                                           | -                                    |
| $\text{Cu}_x\text{HfS}_2$ ( $x \leq 0.5$ )                            | VP      | 3x3x0.05                               | Thin flakes.                                                                                                           | -                                    |
| $\text{Fe}_x\text{ZrS}_2$ ( $x \leq 0.45$ )                           | VP      | 3x3x0.05                               | Thin flakes.                                                                                                           | -                                    |
| $\text{Fe}_x\text{HfS}_2$ ( $x \leq 0.1$ )                            |         | 3x3x0.05                               | Thin flakes.                                                                                                           | -                                    |
| $\text{V}_{1-x}\text{Se}_2$ ( $x \approx 0.10$ )                      | VP      | 2x2x0.1                                | Thin flakes.                                                                                                           | -                                    |

297

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                      | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Calcite I, II, III - aragonite<br>(optically clear single crystals)<br>quartz-coesite/germanium dioxide<br>(Single crystals + polycrystalline) |         | 7 x 7 x 10                             | phase transitions; rate constants; nucleation<br>and growth kinetics at P up to 6 GPa.                                                    |                                      |
| Triglycine sulphate (single crystals)<br>Pb (Zr, Ti)O <sub>3</sub> ceramics<br>BaTiO <sub>3</sub> , CaTiO <sub>3</sub> (single crystals)       |         | 1 x 7 x 7                              | ferroelectric phase transitions; dielectric<br>constant measurements at P up to 6 GPa                                                     |                                      |
| olivine<br>enstatite<br>calcite<br>periclase<br>spinel<br>garnet<br>quartz                                                                     |         |                                        | anisotropic coefficients of lattice thermal cond.,<br>electrical conductivity, dielectric constant,<br>sound velocity, at varying P and T |                                      |
| single crystals                                                                                                                                |         |                                        | in situ-high pressure x-ray diffraction.<br>x-ray diffraction topography                                                                  |                                      |

| 298                                                                                                                                     |         |                                        |                                                                                                                                                                                                                                         |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Professor P.W.M. Jacobs                                                                                                        |         |                                        |                                                                                                                                                                                                                                         |                                      |
| Inst. & Address: University of Western Ontario, Department of Chemistry, London, Ontario, Telephone: (519) 679-2397<br>N6A 5B7, Canada. |         |                                        |                                                                                                                                                                                                                                         |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| Alkali halides                                                                                                                          | M<br>Br | 10x10x5                                | Approx. 0.5 ppm purity; dopants $M^{2+}$ , $A^{2-}$ , $M^+$<br>Ionic conductivity<br>ITC<br>Optical absorption and Emission<br>e.g. J. Phys. Chem. Solids <u>36</u> , 1375, 1383 (1975);<br>J. Phys. (Paris) <u>34</u> , C9-437 (1973). |                                      |
| Ammonium chloride                                                                                                                       | Sol     | 10x10x5                                | Purity unknown: dopants $OH^-$ , $H^+$ , $CrO_4^{2-}$ , $Ni^{2+}$<br>ITC                                                                                                                                                                |                                      |

| 299                                                                                                                       |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Bohumil Kratochvíl                                                                                               |         |                                        |                                                                                                                      |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $Ka_2TeO_4$                                                                                                               | M       | 0.1x0.2<br>x0.3                        | Crystal structure<br>/ Acta Crystallogr. B33,2596, 1977                                                              | -                                    |

| 300                                                                                                     |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Zdeněk Kotrba                                                                                  |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Geological Survey, Malostranské n. 19, Prague 1, Telephone: 22-88-34<br>Czechoslovakia |         |                                        |                                                                                                                      |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Geological samples, silica-<br>tes, semiconductors                                                      |         |                                        | electron probe X-ray microanalysis                                                                                   | ref.mat.<br>+                        |

| <b>301</b><br>Name(s): <b>S. KADEČKOVÁ, B. ŠESTÁK</b><br>Inst. & Address: <b>Institute of Physics ČSAV, Na Slovance 2, 180 40 Prague 8, Czechoslovakia</b><br>Telephone: <b>84 22 41</b> |          |                                        |                                                                                                                                                                                                                                                                                |                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                    | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                           | Material<br>Avail-<br>ability*<br>+ - |
| <b>Fe, (zone refined)</b>                                                                                                                                                                | <b>R</b> | $\varnothing = 4$<br>$l = 90$          | <b>S. Kadečková, B. Šesták: Kristal und Technik 2 (1967), 191</b><br><b>S. Kadečková, B. Šesták: Can. J. Phys. 45 (1967), 1041</b>                                                                                                                                             | <b>+</b>                              |
| <b>Fe - 0,5 wt % Si</b>                                                                                                                                                                  | <b>R</b> | $\varnothing = 4$<br>$l = 90$          | <b>K. Z. Saleeb, S. Kadečková: Kristal und Technik 9 (1974), 1265</b><br><b>S. Kadečková, K. Z. Saleeb: J. Cryst. Growth 30 (1975), 335</b><br><b>S. Kadečková, J. Brádl: J. Cryst. Growth 43 (1973), 301</b>                                                                  | <b>+</b>                              |
| <b>Fe - 3 to 7 wt % Si</b>                                                                                                                                                               | <b>Z</b> | $\varnothing = 13$<br>$l = 200$        | <b>S. Kadečková, B. Šesták: Kristal und Technik 4 (1969), 243</b>                                                                                                                                                                                                              | <b>+</b>                              |
|                                                                                                                                                                                          |          |                                        | <b>Studies of Plasticity:</b><br><b>V. Novák, K. Z. Saleeb, S. Kadečková, B. Šesták: Czech. J. Phys. B 26 (1975), 565</b><br><b>N. Zárubová, B. Šesták: phys. stat. sol. (a) 30 (1975), 365; 479</b><br><br><b>*) Single crystals of the desired orientation are available</b> |                                       |

| <b>302</b><br>Name(s): <b>dr. Zdirad ZAK</b><br>Inst. & Address: <b>Department of Inorganic Chemistry, J. E. Purkyne University</b><br><b>Kotlarska 2, 611 37 BRNO, Czechoslovakia</b><br>Telephone: |                   |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                | METHOD*           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| <b>LiSO<sub>3</sub>F Lithium Fluorosulphate</b>                                                                                                                                                      | <u><b>Sol</b></u> | <b>1x0.5x0.5</b>                       | <b>* crystal structure study</b>                                                                                     |                                      |
| <b>Se<sub>2</sub>O<sub>5</sub> Diseleniumpentoxide</b>                                                                                                                                               | <u><b>Sol</b></u> | <b>5x1x1</b>                           | <b>* crystal structure study</b>                                                                                     |                                      |

| <b>303</b><br>Name(s): <b>Salah Arafa</b><br>Inst. & Address: <b>Materials Engineering and Physical Sciences Department, The American</b><br><b>University of Cairo, 113 Kasr El-Aini Street, Cairo, Egypt</b><br>Telephone: <b>22969 Cairo</b> |            |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                           | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| <b>TiO<sub>2</sub></b>                                                                                                                                                                                                                          | <b>Flu</b> | <b>0,5x0,5x20 rods</b>                 | <b>Containing vanadium and lead impurities</b>                                                                       | <b>+</b>                             |
| <b>Al<sub>2</sub>O<sub>3</sub></b>                                                                                                                                                                                                              | <b>Flu</b> | <b>"</b>                               | <b>Magnetic Properties</b>                                                                                           | <b>+</b>                             |
| <b>NaCl</b>                                                                                                                                                                                                                                     | <b>Br</b>  | <b>10x10x50</b>                        | <b>High purity, color centers and ionic conductivity</b>                                                             | <b>+</b>                             |

| <b>304</b><br>Name(s): Lehto A. and Harjunmaa H.<br>Inst. & Address: University of Helsinki, Department of Physics<br>Siltavuorenpenger 20 D, SF- 00170 Helsinki 17<br>Telephone: 90-650211 |                           |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                       | METHOD*                   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                  | Material<br>Avail-<br>ability<br>+ - |
| Silicon                                                                                                                                                                                     | delayed<br>break-<br>down |                                        | Lifetimes of the Lower Excited s-States<br>of Phosphorus in Silicon at Low Temperatu-<br>res.<br>Samples: 100 ohmcm (room temp) P- doped<br>Silicon.<br>Application: IR- detector.<br>Publications: Lehto A. and Proctor W.G.:<br>J. Phys. C: Solid St. Phys., <u>10</u> , L481-6<br>(1977)<br>Lehto A.: J. Phys. C: Solid St. Phys., <u>10</u> ,<br>L 699- 703 (1977)<br>Lehto A and Proctor W.G.: J. Phys. C: Solid<br>St. Phys., issue of 14 June, in print (1978) | +                                    |

| <b>305</b><br>Name(s): Markus Pessa, Markku Ahonen, Tuomo Suntola, Gunnar Graeffe<br>Inst. & Address: Tampere University of Technology<br>Dept. of Physics, P.O. Box 527, SF-33101 Tampere 10, Finland<br>Telephone: 931-162 111 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| II-VI compound semiconductors<br>(thin films)                                                                                                                                                                                    | MBE     | $10 \times 10 \times 10^{-3}$          | Different orientations are obtainable depending<br>on the substrate material used.<br>Dopants are (usually) Mg and Sn. Properties studied<br>are crystallographic structure of the surface,<br>and electronic structure of the valen-<br>ce band. Characterization of the films is carried<br>out by using UPS/XPS/AES/LEED techniques.<br>The films are prepared for use in optoelectronic<br>devices. | +                                    |

| <b>306</b><br>Name(s): Dr. P. Paufler, Dr. K. Eichler<br>Inst. & Address: TU Dresden, Sektion Physik,<br>DDR 8027 Dresden, Mommsenstr. 13 GDR<br>Telephone: |         |                                               |                                                                                                                                                                                                          |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)        | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                     | Material<br>Avail-<br>ability<br>+ - |
| MgZn <sub>2</sub>                                                                                                                                           | Br      | $\phi = 10 \text{ mm}$<br>$l = 80 \text{ mm}$ | high purity;<br>rod axis prallel (0001);<br>dislocation distribution and mechanical<br>properties as a function of composition<br>within the range of homogeneity.<br>Thesis K. Eichler; TU Dresden 1973 | -                                    |

| 307                                                                            |         |                                                                                   |                                                                                                                                                                                                                                                                   |                                      |
|--------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s):                                                                       |         | E. Krén                                                                           |                                                                                                                                                                                                                                                                   |                                      |
| Inst. & Address:                                                               |         | CENTRAL RESEARCH INSTITUTE FOR PHYSICS<br>H-1525 Budapest 114, P.O.B. 49, Hungary |                                                                                                                                                                                                                                                                   | Telephone: 166-440                   |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                            | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
| Gd <sub>3</sub> Ga <sub>5</sub> O <sub>12</sub><br>/Gadolinium-Gallium-Garnet/ | CZ      | Ø 25x100                                                                          | Purity: 4N<br>Orientation: <111><br>Characteristics: dislocation free<br>Application: Substrate material                                                                                                                                                          | +                                    |
| /Y, Sm, Ca/ <sub>3</sub> /Fe, Ge/ <sub>5</sub> O <sub>12</sub>                 | LP      | Ø 20 mm<br>Thickness:<br>5 µm                                                     | Orientation: <111><br>Characterized defects, magnetic properties<br>Application: bubble memory<br>Publication: B. Keszei, M. Pardavi-Horváth;<br>Coercivity of /YSmCa/ <sub>3</sub> /FeGe/ <sub>5</sub> O <sub>12</sub><br>LPE Films, INTERMAG, Florence<br>1978. | +                                    |

| 308                                                                                                             |                             |                                                                      |                                                                                                                                                                                                                                                              |                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name(s):                                                                                                        |                             | K. Veerabhadra Rao,<br>Advanced Centre for<br>Materials Science, and |                                                                                                                                                                                                                                                              | T.S. Narasimhamurthy,<br>Department of Physics,<br>Osmania University,<br>Hyderabad-500 007, India. Telephone: 40066<br>ext. 296<br>(KVR)<br>220338<br>(TSN) |
| Inst. & Address: IIT, Kanpur-208 016, India                                                                     |                             |                                                                      |                                                                                                                                                                                                                                                              |                                                                                                                                                              |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                           | METHOD*                     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                               | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                         | Material<br>Avail-<br>ability<br>+ -                                                                                                                         |
| NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub><br>Ammonium dihydrogen<br>phosphate                              | S                           | 90 x 70<br>x45                                                       | Purity of chemicals for all these<br>crystals has been 99.9%. Properties<br>studied include birefringence, linear<br>electrooptic and photoelastic behavior.<br>Determined all the stress optical (q <sub>ij</sub> ),                                        | +                                                                                                                                                            |
| KH <sub>2</sub> PO <sub>4</sub><br>Potassium dihydrogen<br>phosphate                                            | S                           | 55 x 25<br>x15                                                       | strain optical (p <sub>ij</sub> ), linear electro-<br>optic (r <sub>ij</sub> ) constants (clamped and<br>unclamped) and their dispersion by<br>studying different orientations.                                                                              | +                                                                                                                                                            |
| NaKC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> ·4H <sub>2</sub> O<br>Rochelle salt                             | S                           | 80 x 50<br>x25                                                       | Applications are light modulators,<br>deflectors etc., by electrooptic and<br>acoustooptic techniques.                                                                                                                                                       | +                                                                                                                                                            |
| NaNO <sub>3</sub><br>Sodium nitrate<br>(p <sub>ij</sub> /p <sub>kl</sub> only)                                  | Br <sup>+</sup><br>and<br>S | 70 (len)<br>12 (dia.)<br>and<br>18 x 15<br>x8                        | J. Mater. Sci. (UK), 8, 577 (1973)*<br>J. Mater. Sci. (UK), 10, 1019 (1975)<br>J. Opt. & Quantum Electron. (UK),<br>8, 255 (1976)<br>J. Phys. C: Solid State (UK),<br>11, 2343 (1978)<br>Ph.D. Thesis (KVR), Osmania University,<br>Hyderabad, India (1972). | -                                                                                                                                                            |
| +In collaboration with<br>Dr. Kolluri V. Ramanaiah,<br>PSG College of Technology,<br>Coimbatore-641 004, India. |                             |                                                                      | *In collaboration with Dr. Howard L.<br>Petterson, Albion College, Albion,<br>Michigan, 49224, USA.                                                                                                                                                          |                                                                                                                                                              |

**309** R.Y. Deshpande, G.L. Bhide, Malathi Ghosh, S.C. Sabharwal, G. Alexander, U.R. Marwah, S.M.D. Rao, Gurnam Singh, Name(s): R.V. Srikantiah, T. Mirza, S.C. Karandikar, S.S. Unki, K. Ramachandran, K.S. Keswani, M.N. Ahuja, M.K. Rajpurkar, G.P. Kothiyal and B. Ghosh.  
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl, KBr, NaCl                                                        | M, Br   | 150 di x 150                           | Optran grade, random orientation, used as optical windows.                                                                                               | +                                    |
| NaI                                                                   | M, Br   | 80 di x 80                             | Scintillator quality, random orientation, Tl dopant, used as nuclear radiation detectors.                                                                | +                                    |
| CsI                                                                   | M, Br   | 50 di x 50                             | Scintillator quality, random orientation, used as nuclear radiation detectors.                                                                           | +                                    |
| Anthracene Stilbene                                                   | M, Br   | 35 di x 35                             | Optical quality, random orientation, used as nuclear radiation detectors.                                                                                | +                                    |
| Cu                                                                    | M, Br   | 20 di x 100                            | OFHC quality, random orientation, dislocation studies.                                                                                                   | +                                    |
| Cu                                                                    | Cz      | 30 di x 150                            | OFHC quality, <110> orientation, used for neutron diffraction.                                                                                           | +                                    |
| Ge                                                                    | Cz      | 35 di x 150                            | Optical filter and driftable quality <111> and <100> orientations, used for IR filters and Ge (Li) detectors.                                            | +                                    |
| LiF, CaF <sub>2</sub>                                                 | M, Br   | 30 di x 30                             | Optran grade, random orientation, Fu dopant, TL studies made, optical windows and membrane electrodes, Paper No. A 7/141 to be published in the Analyst. | +                                    |

**310** R. Y. Deshpande, G. L. Bhide, Malathi Ghosh, S. C. Sabharwal, G. Alexander, U. R. Marwah, S.M.D. Rao, Name(s): Gurnam Singh, R. V. Srikantiah, T. Mirza, S. C. Karandikar, S. S. Unki, K. Ramachandran, K. S. Keswani, M. N. Ahuja, M. K. Rajpurkar, G. P. Kothiyal, and B. Ghosh  
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                        | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ADP, KDP                                                              | Soi     | 150x30x30                              | Optical grade, C axis along the longest dimension, radiation damage studies, Laser beam modulator and SHG, J. Rad. Effects, 30, 123 (1976). | +                                    |
| As <sub>2</sub> S <sub>2.15</sub>                                     | VP      | 3x1x0.2                                | Five N purity, needle axis is coincident with <110>, optical and electrical properties studied, J. Cryst Growth, 32, 29 (1976).             | +                                    |
| As <sub>2</sub> S <sub>3</sub>                                        | VP      | 2x1x0.2                                | Five N purity, needle axis coincident with <110>, optical and electrical properties.                                                        | -                                    |
| As <sub>2</sub> Se <sub>3</sub>                                       | VP      | 4x2x0.1                                | Five N purity, optical, electrical and photoconducting properties.                                                                          | +                                    |
| As <sub>2</sub> Te <sub>3</sub>                                       | VP      | 2x0.5x0.5                              | Five N purity, optical, electrical and photoconducting properties.                                                                          | +                                    |

666-701-418

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Name(s): M. R. L. N. Murthy and Dr. N. S. Satya Murthy (Head, Solid State Physics Section)

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <u>Single Crystals:</u>                                               |         |                                        |                                                                                                                                          |                                      |
| $\text{Cu}_2\text{MnAl}$                                              | Br      | 6 mm dia,<br>40 mm long                | Starting materials purity 99.99%<br>Application - neutron polariser                                                                      | -                                    |
| YIG                                                                   | Flu     | 10 mm cube                             | Starting materials purity 99.99%<br>Application - neutron diffraction studies                                                            | +                                    |
| Aluminum                                                              | Br      | 80 mm dia,<br>150 mm long              | Starting material purity 99.99%<br>Application - neutron monochromators                                                                  | +                                    |
| Copper                                                                | Cz      | 30 mm dia,<br>100 mm long              | Starting material purity 99.99%<br>Application - Fabrication of vertical<br>focussing monochromators                                     | +                                    |
| Bismuth                                                               | Br      | 40 mm dia,<br>150 mm long              | Starting material purity - zone refined<br>Application - $\gamma$ -ray filtering and increased<br>transmission of low energy<br>neutrons | +                                    |

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Name(s): M.R.L.N. Murthy and Dr. N.S. Satya Murthy (Head, Solid State Physics Section)

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                 | METHOD*                              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.              | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <u>Polycrystalline Materials:</u>                                                                                                                                                                                                                     |                                      |                                        |                                                                                                                                   |                                      |
| Alloys: Heusler alloys such as $\text{Pr}_2\text{MnGe}$ , $\text{Pd}_2\text{MnSn}$ , etc.; alloy of Fe-Ge, Co-Ga, Mn-Sn systems, etc.; ternary alloys $\text{FeMnGe}$ , $\text{MnAlGe}$ , $\text{GaCoCuFe}$ , etc.; and carbides of Mn-Co, MnNi, etc. | Arc and induction melting, annealing | 20-30 g of the alloy                   | Starting materials purity 99.99% to 99.999%<br>Application: neutron scattering and Mossbauer effect                               | +                                    |
| $\text{CoAl}$ , $\text{FeAl}$ , $\text{NiAl}$                                                                                                                                                                                                         | Arc melting, annealing               | 10-15 g                                | Starting material purity 99.99%<br>Application: Compton scattering studies                                                        | +                                    |
| $\text{Ti}_{0.62}\text{Zr}_{0.38}$                                                                                                                                                                                                                    | Arc melting, extrusion               | 1 Kg charge                            | Starting material purity 99.9%<br>Application: Cassettes for neutron scattering work at high pressures                            | +                                    |
| $\text{MFe}_2\text{O}_4$ for M = Mn, Cu, Zn, etc.; $(\text{MN})\text{Fe}_2\text{O}_4$ for MN = (NiZn), (MgMn), (NiV), etc.                                                                                                                            | Sintering and wet methods            |                                        | Starting materials are Analar grade chemicals<br>Application: neutron scattering and Mossbauer effect                             | +                                    |
| Chalcogenides $\text{CoS}_{1.4}\text{Se}_{0.6}$ and FeS                                                                                                                                                                                               | Annealing                            |                                        | Starting materials are Analar grade chemicals and metals of 99.99% purity<br>Application: neutron scattering and Mossbauer effect | +                                    |

313

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. Calcium Sulphate - $\text{CaSO}_4$                                 | Sol.    | polycrystals                           | Doped with lanthanide rare earth elements at various concentrations ranging between 0.01 and 10% by wt.; studies on Thermoluminescence and Electron Spin Resonance characteristics; applications in Radiation Dosimetry - J.Rhy.C Solid St. Phys.7(1974)4403-15.                                                 | +                                    |
| 2. Calcium Fluoride - $\text{CaF}_2$                                  | Br.     | 9.55 x 50(L)                           | Doped with lanthanide rare earth elements at various concentrations- typically at 0.05% by wt. - either singly or in pairs of the dopant; studies on Thermo-luminescence characteristics - reference in Proc. of A Specialists Meeting on TL Dating, Oxford, 1978 (to be published in RACT Journal, Strasbourg). | +                                    |
| 3. Lithium Fluoride - $\text{LiF}$                                    | Br.     | 9.55 x 50(L)                           | Doped with Mg, Ti, Mg/Ti and rare earth elements at a typical concentration of 0.1% by wt.; studies on Thermoluminescence emission characteristics - Proc. of National Symposium on Thermoluminescence, 1975, pp 365-72, Pub. by Bhabha Atomic Research Centre, Bombay.                                          | +                                    |
| 4. Lithium Tetraborate - $\text{Li}_2\text{B}_4\text{O}_7$            | M.      | glassy butt.                           | Doped with rare earth elements at 1.6% by wt. conc.; studies on TL Characters - Proc. Fifth Int. Conf. on Lumines. Dosim. 1977, pp 197-206, Physik. Inst. Giessen.                                                                                                                                               | -                                    |

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Name(s): A. J. Singh, P. Suryanarayana, T. K. Das, G. S. Rao, M. D. Karkhanavala

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Ag, Silver                                                            | Br, Cz       | 7 x 7 x 80                             | Undoped, Basic research (diffusion studies)                                                                          | +                                    |
| Bi, Bismuth                                                           | Br           | 40 x 40 x 150                          | Undoped, Neutron attenuation                                                                                         | +                                    |
|                                                                       | Cz           | 20 x 20 x 65                           | Undoped, Research and development                                                                                    | +                                    |
| Sb, Antimony                                                          | Z            | 25 x 25 x 10                           | Undoped, Basic research, Purity 99.999+                                                                              | +                                    |
| Te, Tellurium                                                         | Br           | 10 x 10 x 20                           | Undoped, Electro-optics (nonlinear), Purity 99.999+                                                                  | +                                    |
| PbI <sub>2</sub> , Lead Iodide                                        | Br           | 10 x 10 x 10                           | Basic research                                                                                                       | -                                    |
| Bi <sub>2</sub> Te <sub>3</sub> , Bismuth telluride                   | Br           | 15 x 15 x 25                           | Undoped, Basic research                                                                                              | -                                    |
| PbSe, Lead selenide                                                   | Br           | 20 x 10 x 10                           | Undoped, Basic research                                                                                              | -                                    |
| Pb <sub>0.8</sub> Sn <sub>0.2</sub> Se, Lead tin selenide             | Br           | 20 x 20 x 50                           | Undoped, Basic research                                                                                              | -                                    |
| InSb, Indium antimonide                                               | Cz           | 6 x 6 x 80                             | Undoped, Research & development                                                                                      | -                                    |
| GaAs, Gallium arsenide                                                | Br           | 5 x 5 x 20                             | Undoped, Research & development                                                                                      | -                                    |
| GaP, Gallium phosphide                                                | Sol          | 1 x 5 x 5                              | Undoped, Research & development                                                                                      | -                                    |
| CdTe, Cadmium telluride                                               | Sol<br>(THM) | 10 x 10 x 10                           | Undoped, Basic research                                                                                              | -                                    |
| PbTe, Lead telluride                                                  | Br           | 10 x 15 x 30                           | Undoped, Basic research                                                                                              | -                                    |

| <b>315</b><br>Name(s): G. Alexander<br>Inst. & Address: Ore Extraction Section, Chemical Eng. Group, Technical Physics Division, Bhabha Atomic Research Center, Bombay, India<br>Telephone: 523321 Ext. 602 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                               |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| Germanium<br>Ge                                                                                                                                                                                             | Cz      | 30 mm dia,<br>100 mm long              | Purity - $\approx 10^{14}$ impurity atoms/cc<br>Orientation - $\langle 111 \rangle$ and $\langle 100 \rangle$<br>Dopants - gallium<br>Properties studied - Resistivity, etch<br>and pit density, charge carrier lifetime,<br>lithium precipitation rate, and lithium<br>drift rate<br>Application - Lithium-drifted $\gamma$ -ray detector,<br>infrared filters and detectors | +                                    |

| <b>316</b><br>Name(s): M. D. SASTRY<br>Inst. & Address: Radiochemistry Division, Bhabha Atomic Research Centre, Trombay, Bombay 400 085, India<br>Telephone: 523321 (456) |         |                                        |                                                                                                                                                               |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                          | Material<br>Avail-<br>ability<br>+ - |
| Ammonium Chloride<br>$\text{NH}_4\text{Cl}$                                                                                                                               | Sol     | 3 x 3 x 3                              | Well developed {100} faces.<br>Pd dopant. Structure of Pd complexes<br>by electron paramagnetic resonance (EPR)<br><br>J. Chem. Phys. <u>64</u> , 3957 (1976) | +                                    |
| Potassium ferrocyanide<br>trihydrate (KFCT)<br>$\text{K}_4\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$                                                               | Sol     | 2 x 2 x 5                              | Co dopant. Ferroelectric transition by EPR<br><br>Phys. Rev. B <u>13</u> , 1156 (1976)                                                                        | -                                    |

| <b>317</b><br>Name(s): DRS. M. D. Karkhanavala, V. Amrithalingam, and U. R. K. Rao<br>Inst. & Address: Chemistry Division, Bhabha Atomic Research Centre, Bombay 400 085, India<br>Telephone: |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| $\text{Na}_2\text{SO}_4$ (III) Orthorhombic<br>(Sodium Sulphate anhydrous,<br>orthorhombic)<br>(metastable at RT)                                                                             | Sol     | Needles                                | 99.99%, needle axis is C axis of the orthorhombic<br>unit cell.<br>Studied:<br>(a) The topotactic phase transition of III to<br>hexagonal (I), using single crystal x-ray<br>technique; V. Amrithalingam, M. D. Karkhanavala,<br>and U. R. K. Rao, Acta Cryst. A33, 522 (1977).<br>(b) Optic orientation in $\text{Na}_2\text{SO}_4$ (III) determined<br>and its relation to the topotactic phase<br>transition to the uniaxial (I) determined;<br>V. Amrithalingam, U. R. K. Rao, and S. F. Sethna,<br>Symposium on Crystallography and Crystal Physics,<br>Osmania University, Hyderabad, India, Dec. 1977. | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Metastable solid solutions in Lead-Tin<br>Alloys                      | M       | Ingots                                 | A. R. grade<br><br>Amount of Solute (Pb)      Phase Lattice Parameters c/a<br>At.%      a(Å)      c(Å)<br>15      Tetrag-      5.9503      3.3551, 0.5638<br>10      onal      5.9950      3.3857, 0.5648<br>20      "      6.0496      3.4511, 0.5706<br>25      "      6.1004      3.4849, 0.5712<br>30      "      6.1325      3.5204, 0.5760<br><br>Lattice Parameters as given above were determined.<br>Publication: Curr. Sci. <u>43</u> (11), 339 (1974) | Not<br>availabl                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)             | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. $\text{ZnGeP}_2$ , Zinc Germanium Phosphide                                                                                                                                           | Br      | $5 \times 5 \times 3 \text{ mm}^3$                 | Etching solutions and Crystal orientation.<br>Publication :- "Etching Solutions for the<br>determination of the Crystallographic axes<br>of $\text{ZnGeP}_2$ ". Journal of Crystal Growth<br><u>42</u> (1978), 120.            | +                                    |
| 2. Si, Silicon                                                                                                                                                                           | Br      | $3 \times 3 \times 0.5 \text{ mm}^3$<br>in general | Contact properties.<br>Publication :- "A Pulse Method for the<br>Measurement of contact-Resistance and Bulk<br>Resistance of Semiconductor Samples"<br>'The Journal of the Electrochemical Society'<br><u>125</u> (1978), 508. | +                                    |
| 3. (A) Si, Silicon<br>(b) Ge, Germanium<br>(c) GaAs, Gallium Arsenide<br>(d) InAs, Indium Arsenide<br>(e) InSb, Indium Antimonide<br>(f) $\text{ZnGeP}_2$ , Zinc Germanium<br>Phosphide. | Br      | $10 \times 5 \times 1 \text{ mm}^3$<br>in general  | Conductivity type testing.<br>Publication :- "Cold Probe Semiconductor<br>Type Tester."<br>'Review of Scientific Instruments',<br><u>48</u> (1977), 1720.                                                                      | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Prepared : Synthetic Quartz<br>Single Crystals<br>(Colourless) - $\text{SiO}_2$<br><br>Studied : Natural Quartz<br>Single Crystals<br>(Colourless),<br>Natural Amethyst,<br>Natural Citrine,<br>Smoky Synthetic<br>Quartz Single<br>Crystals - $\text{SiO}_2$ | Hyd     | 150 x 25<br>x 15 mm <sup>3</sup>       | Total Impurities- 135 ppm; Y-bar sec <sup>2</sup> . . . 4;<br>Li satts; Mechanical Q; IR-spectra; Hydro-<br>gen concentration, distribution and orien-<br>tation; Metallic impurities; X-ray irradi-<br>ation and Heat-treatment.<br>1. D. Chakraborty and P. Saha, Indian J. Tech-<br>nol. 11(1973) 127<br>2. D. Chakraborty and P. Saha, Indian J. Tech-<br>nol. 12(1974) 189<br>3. D. Chakraborty and P. Saha, Indian J. Phys.<br>48 (1974) 432<br>4. D. Chakraborty and G. Lehmann, J. Sol. State<br>Chem. 17 (1976) 305<br>5. D. Chakraborty and G. Lehmann, Physica<br>Status Solidi (a) (1976) 487<br>6. D. Chakraborty, J. Crystal Growth 36/1<br>(1976) 188.<br>7. D. Chakraborty & G. Lehmann, Neues Jahr.<br>Miner. Monats. 7 (1977) 289<br>8. D. Chakraborty, J. Crystal Growth 41/1<br>(1977) 177<br>9. D. Chakraborty & G. Lehmann, Z. Naturfors-<br>chung 33(a) (1978) 290<br>10. D. Chakraborty, Indian J. Phys. (In print)<br>11. D. Chakraborty, J. Crystal Growth (In print)<br>12. D. Chakraborty, J. Materials Science (=do=)<br>13. D. Chakraborty, (Under publication)<br>14. D. Chakraborty, (Under publication) | Not<br>for<br>sale                   |

321

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                       | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Quartz ( $\text{SiO}_2$ ) (studied)                                                                                                                      | Hyd     | 150x50x40                              | Surface characterization, growth mechanism,<br>etching and imperfection studies (contact<br>for publications)                                                                              | Inquire                              |
| Lanthanum Borate ( $\text{LaBO}_3$ )<br>(prepared and studied)                                                                                           | Flu     | 10x3x1                                 | Orientation, characterization (contact for<br>publication)                                                                                                                                 | -                                    |
| Dysprosium Vanadates ( $\text{DyVO}_4$ )<br>(prepared)                                                                                                   | Flu     | 20x2x2                                 | Study to be taken up                                                                                                                                                                       | -                                    |
| Rare Earth compounds particularly<br>$\text{RFeO}_3$ , $\text{RCrO}_3$ , $\text{RAIO}_3$ , $\text{RMnO}_3$ , $\text{RNbO}_4$<br>(R = Rare earth) (study) | Flu     | Varying<br>sizes                       | Surface characterization, growth mechanism, etching<br>and imperfection studies (taken up in collaboration<br>with Crystal Growing Group of Clarendon Laboratory,<br>University of Oxford) | -                                    |
| $\text{KMgF}_3$ (Pure & Doped with Ni) (study)                                                                                                           | Cz      | Boules<br>15x12x12                     | Ditto                                                                                                                                                                                      | -                                    |
| Glycine, Potassium Nitrate,<br>Potassium Nitrite, Potassium<br>Phthalate (prepared)                                                                      | Sol     | 5x4x4;<br>25x4x3;<br>15x1x1, 5x3x3     | Growth kinetics and characterization studies                                                                                                                                               | -                                    |
| Zinc Sulfate (prepared)                                                                                                                                  | Gel     | 6x5x3                                  | Ditto                                                                                                                                                                                      | -                                    |
| Amethyst ( $\text{SiO}_2$ ),<br>Natro-lite (study)<br>& Apophyllite (study)                                                                              | Nat*    | 15x10x6<br>50x2x1<br>20x15x15          | Surface characterization<br>growth mechanism, etching & imperfection studies<br>(Contact for publications)                                                                                 | -<br>-<br>-                          |
| *Natural variety                                                                                                                                         |         |                                        |                                                                                                                                                                                            |                                      |

| <b>322</b><br>Name(s): Dr. Ramji Srivastava<br>Inst. & Address: School of Studies in Physics, Jiwaji University, Gwalior, India 474002 Telephone: |         |                                        |                                                                                                                                                                                                                                                        |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
| Thin films of Tungsten Oxide ( $WO_3$ )                                                                                                           | VP      | 5 x 5 mm<br>x 5000<br>Angstroms        | Electrical conduction, breakdown and dielectric properties, films characterized for $WO_3$ by electron diffraction                                                                                                                                     |                                      |
| Thin films of Molybdenum Oxide ( $MoO_3$ )                                                                                                        | VP      | 5 x 5 mm<br>x 5000<br>Angstroms        | Electrical conduction, breakdown and dielectric properties, films characterized for $MoO_3$ by electron diffraction<br><br>Publications:<br>J. Phys. Soc. Japan 39, 1316 (1975)<br>Thin Solid Films 28, L-13 (1975)<br>Thin Solid Films 30, 319 (1975) |                                      |

| <b>323</b><br>Name(s): Dr. M.A. ITTYACHEN<br>Inst. & Address: Department of Physics, University of Kerala, Kariavattom, Trivandrum, Kerala, INDIA. Telephone: 8420 |         |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                              | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| $PbMoO_4$ (Lead molybdate)                                                                                                                                         | Gel     | 2 x 2                                  |                                                                                                                      | +                                    |
| $BaMoO_4$ (Barium molybdate)                                                                                                                                       | Gel     | 1 x 2                                  |                                                                                                                      | +                                    |
| $CaCO_3$ (Calcium carbonate)                                                                                                                                       | Gel     | 1 x 2                                  |                                                                                                                      | +                                    |
| $PbCO_3$ (Lead carbonate)                                                                                                                                          | Gel     | 2 x 2                                  |                                                                                                                      | +                                    |
| $MnCO_3$ (Manganese carbonate)                                                                                                                                     | Gel     | 2 x 2                                  | Dislocation studies,<br>X-ray & I.R. studies<br>doped with different<br>materials.                                   | +                                    |

| <b>324</b><br>Name(s): Dr. Ingle Sharadchandra Govind<br>Inst. & Address: Laxminarayan Institute of Technology, Nagpur 440010, India Telephone: 31659 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
| $KNbO_3$<br>(Potassium Niobate)                                                                                                                       | Flu     | 1cm X 1cm<br>X 1cm                     | Suitable for domains study. Domain structure highly susceptible to defects like impurity ions and dislocations. Properties studied: domain structure distinction between thin and thick crystals, influence of defects. Publications - J. Phys. D, Appl. Phys. (U.K.) 4, 124 (1971); 4, 1633 (1971); 5, 1474 (1972); 6, L103 (1973); 6, 1816 (1973); 10, L149 (1977). J. Appl. Phys. (USA) 45, 5152 (1974). Ind. J. Pure Appl. Phys. 10, 29 (1972); 10, 353 (1972); 10, 839 (1972); 10, 881 (1972); 15, 323 (1977). Curr. Sci. 39, 368 (1970). | -                                    |
| $PbNb_2O_6$<br>(Lead Metaniobate)                                                                                                                     | M       | 1mmX1mmX0.4<br>mm                      | Properties studied: As above<br>Publications: Pramana 10, 163 (1978); 10, (1978) in press. Ind. J. Pure Appl. Phys. 16, (1978) in press.                                                                                                                                                                                                                                                                                                                                                                                                       | -                                    |
| (NaCl + KCl)<br>(Two-phase mixed crystals of<br>NaCl + KCl)                                                                                           | Sol     | 0.5cm X 0.5<br>cm X 0.3cm              | These two-phase mixed crystals are different from the melt grown mixed crystals that are crystallographically the solid solution of NaCl and KCl and hence single phase. Properties studied: X-ray studies of structure; etching studies of dislocation substructure, growth mechanism; impurity ion diffusion across the phase boundaries; phase changes at higher temperatures, etc. Publications: J. Phys. D, Appl. Phys. (1978) in press.                                                                                                  | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                 | METHOD*                               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                       | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl, NaCl single crystals                                                                                                                                                                                                                                                                                             | Melt                                  | 50 x50 x50                             | BDH quality<br>Dopants: Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ag <sup>+</sup> , etc.<br><br>Electronic properties are being studied by positron<br>annihilation techniques | +                                    |
| Iron-Nickel alloys                                                                                                                                                                                                                                                                                                    | Induct-<br>tion<br>furnace<br>melting | 10x10x5                                | Magnetic properties on order-disorder transformation<br>are being studied by Mossbauer effect and positron<br>annihilation techniques                                      | +                                    |
| ZrMoFe <sub>2</sub> intermetallic compounds                                                                                                                                                                                                                                                                           | Arc<br>melting                        |                                        | Mossbauer studies                                                                                                                                                          | +                                    |
| Polycrystalline spinel ferrites<br>$\left. \begin{array}{l} \text{Ni}_x\text{Cu}_{1-x}\text{Fe}_2\text{O}_4 \\ \text{Mn}_x\text{Cu}_{1-x}\text{Fe}_2\text{O}_4 \\ \text{Ni}_x\text{Cd}_{1-x}\text{Fe}_2\text{O}_4 \end{array} \right\} \begin{array}{l} x = 0, 0.2, 0.4, \\ 0.6, 0.8, \text{ and} \\ 1.0 \end{array}$ | Ceramic<br>sinter-<br>ing             | Polycrystal-<br>line powder            | Magnetic and electrical properties are studied by<br>Mossbauer, dielectric, and conductivity measure-<br>ments                                                             | +                                    |

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Name(s): Dr. K. L. Bhatia, Dr. P. K. Bhat

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                          | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------------------------|----------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| (As <sub>2</sub> S <sub>3</sub> ) <sub>1-x</sub> (PbS) <sub>x</sub><br>Arsenic-Lead Sulfosalts | M<br>Sol | 3-8 mm dia.<br>Disc/chips              | <p>Prepared from high purity semiconducting grade As<sub>2</sub>S<sub>3</sub> and PbS or constituent elements. Glassy semiconductors.</p> <p>Properties studied: Thermal analysis (DSC, TGA), microstructure studies by electron-microscopy. Far-infrared transmission, electrical conductivity and photoconductivity, elastic constants by ultrasonic propagation</p> <p>Publications:</p> <p>J. Non-Crystalline Solids 27, 399 (1978)<br/>Solid State Comm. 22, 789 (1977)<br/>J. Phys. C (Solid State) 11, L479 (1978)<br/>Phys. Chem. Glass. (August 1978) (in press)</p> |                                      |

| <b>327</b><br>Name(s): P. R. SARODE<br>Inst. & Address: Physics Department, Nagpur University, Nagpur, India. Present Address: Telephone: 31946<br>Solid State & Strl. Chem. Unit, Indian Institute of Science, Bangalore 12, India |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                               | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
| $\text{RCO}_2$ , $\text{RCO}_3$ , $\text{RCO}_5$ (where R stands<br>for a rare earth or yttrium),<br>Metastable lead-tin alloys                                                                                                     | M       | --                                     | X-ray diffraction, X-ray emission, fluorescence<br>and absorption spectra, electronic structure, and<br>nature of chemical bonding<br><br>Publications:<br>P. R. Sarode and A. R. Chetal,<br>J. Phys. C: Solid State Phys. <u>9</u> , 153 (1977)<br><br>P. R. Sarode and A. R. Chetal,<br>J. Phys. Soc. Japan <u>40</u> , 1637 (1976)<br><br>P. R. Sarode and A. R. Chetal,<br>Curr. Sci. (India) <u>43</u> , 339 (1974)<br><br>P. R. Sarode and A. R. Chetal,<br>J. Phys. F: Metal Phys. <u>7</u> , 1103 (1977) | -                                    |

| <b>328</b><br>Name(s): Dr. L.C.GUPTA<br>Inst. & Address: Tata Institute of Fundamental Research Telephone: 219111 Ext.356<br>Homi Bhabaha Road, Colaba, Bombay 400 005 |                     |                                              |                                                                                                                                                                        |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                  | METHOD*             | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                   | Material<br>Avail-<br>ability<br>+ - |
| 1. $\text{REX}_2\text{Si}_2$<br>(RE = La, Ce, Pr; X = Cu, Ag, Au)                                                                                                      | Arc<br>melt-<br>ing | Powder                                       | 99 % ; powder<br>property studied<br>Knight shift of Si; valence<br>fluctuation of Cerium<br>characterization<br>X-ray<br>Publications<br>under preparation            | +                                    |
| 2. $\text{Bi}_4(\text{SiO}_4)_3$ ; $\text{Bi}_4(\text{GeO}_4)_3$                                                                                                       | CZ                  | irregular,<br>volume<br>more<br>than<br>2cc. | Purity - Not known<br>Properties studied<br>NQR of Bi<br><br>Publications:<br>K.V.Gopalakrishnan, L.C.Gupta<br>and R. Vijayaraghavan<br>Pramana, <u>6</u> , 343 (1976) | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                                                                      | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. Heteroepitaxial growth of single crystal solid solutions of Si-Ge grown from the vapour on Si substrates. | GE      | Diameter -<br>- 25 mm<br>Si substrate<br>thickness -<br>- 0.25 mm<br>Ge-Si layer<br>thickness -<br>- $12 \cdot 10^{-3}$ mm. | Basic materials:<br>SiCl <sub>4</sub> , GeCl <sub>4</sub> (liquid) 99.9995%<br>Dopants: PH <sub>3</sub> , B <sub>2</sub> H <sub>6</sub> diluted in H <sub>2</sub> (5 p.p.m) high purity electronic grade.<br>Growth orientations: (111); (110); (100).<br>Properties studied: study of growth processes, calibration and Transfer Curves, Changes in lattice constants as function of the layer composition, surface oxidation, characterization of various defects. Interface problems between the hetero-epitaxial layer and the substrate. The Ge content in the (111) orientation reached up to 30%.<br>Publications:<br>1) Thin Solid Films Vol. 12, No. 1, Sept. 1972.<br>2) J. Cryst. Gr. 17, 1972 (2 papers).<br>3) Israel J. Tech. Vol. 14, No. 4/5, 1977.<br>4) Proc. Symposium of Joint Chapters S/AP/MTT and G-ED/PHP - IEEE in Israel, April 1976, pp. 18-31. |                                      |
| 2. Epitaxial growth of single crystal Si layers grown on Si substrates.                                      | GE      | Diameter -<br>- 25 mm<br>Si substrate<br>thickness -<br>- 0.25 mm<br>Si layer<br>thickness -<br>- $20 \cdot 10^{-3}$ mm.    | Basic material - SiCl <sub>4</sub> , dopants, orientations as above. Properties studied: Influence of growth parameters on layer quality and their defects.<br>Publications:<br>1) Vacuum, Vol. 24, No. 2, 1974.<br>2) Vacuum, Vol. 26, No. 4/5, 1976 (3 papers).<br>3) Proc. 7th Natl. Conv. IEEE, Israel, pp. 99-109, April 1971.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| PYROELECTRIC COEFFICIENT<br>MEASUREMENT                               |         |                                        | STATIC AND DYNAMIC COEFFICIENTS OVER 90 -380K<br>TEMPERATURE RANGE.                                                  |                                      |

| <b>331</b><br>Name(s): Zelingher, Flicstein, Zangvil<br>Inst. & Address: Ben Gurion University of the Negev, Faculty of Technology, Beersheva. Telephone: 057- |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
| NaCl, NaBr, NaNO <sub>3</sub> , NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> , KCl,<br>KBr, KNO <sub>3</sub>                                                 | Ze      | 150 x 0.001<br>x 0.001<br>mm.          | Purity: 99%<br>Orientation: [100] (KCl, NaCl)<br>Characterization: Laue X-Ray Technique,<br>Electron Microscope Diffraction,<br>Electron Microprobe Microanalyzer.<br>Applications: In Study<br>Publications:<br>1) N. Zelingher, J. Flicstein, A. Zangvil, "Sodium Acetate Tri-Hydrate Whisker", Journal of Crystal Growth 42(1977) 253-258.<br>2) A. Zangvil, N. Zelingher, J. Flicstein, "Growth Mechanism of NaCl and KCl Whiskers Grown by Zelingher's Method", Ben Gurion University of the Negev, Department of Materials Engineering, Internal Report 12/77.<br>3) N. Zelingher, "Mass Transport Trough Cellulose Acetate Membrane - A New Concept". Proceedings of the Sixth International Symposium on Fresh Water from the Sea, Las Palmas, Gran Canaria, Spain, Sept. 1978. | +                                    |
| Ze = Zelingher's Membrane Method.                                                                                                                              |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |

| <b>332</b><br>Name(s): J. Shafir<br>Inst. & Address: The Hebrew University, Dept. of Inorganic & Anal. Chemistry, Jerusalem, Israel Telephone: |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
| Pb <sub>1-x</sub> Sn <sub>x</sub> Te (LTT)                                                                                                     | PJux    | 20-100 um                              | Polycrystalline material to be used as raw material for single crystal growth or epitaxial film preparation. The materials were characterized by powder X-rays, the cell constants following Vegard law. Particle size determined by electron microscope scanning. Preparation by reacting together all the elements, lead, tin, tellurium and iodine, forming the lead iodide flux in situ. The purity of the products similar to those of the original materials used for the reaction.<br>(submitted for publication). |                                      |

| <b>333</b><br>Name(s): M. Schieber, I. Beinglass, G. Dishon, I. Meloslavski, A. Holzer<br>Inst. & Address: School of Applied Science, Hebrew University of Jerusalem, Israel Telephone: (02) 30211 x 693 |         |                                        |                                                                                                                                        |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                   | Material<br>Avail-<br>ability<br>+ - |
| H I <sub>2</sub><br>8 2                                                                                                                                                                                  | Sub.    | 20 X 10 X 10                           | can be cleaved into (001) plates for nuclear detectors. See e.g., Schieber et al., Nucl. Inst. and Methods <u>150</u> , (1978), 71-77. | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KTaO <sub>3</sub> (POTASSIUM TANTALATE)                               | Flu     | 2x2x5                                  | dopants: Li, Na, Nb<br>properties studied: dynamical properties and phase<br>transitions using Raman spectroscopy<br>publications: Y. Yacoby and A. Linz Phys. Rev. <u>9</u> 2723<br>(1974)<br>Y. Yacoby and S. Just Sol. Stat. Comm. <u>15</u> 715 (1974)<br>Y. Yacoby, Z. Physik B24 397 (1976)<br>Y. Yacoby, Z. Physik, to be published | +                                    |
| SrTiO <sub>3</sub> (STRONTIUM TITANATE)                               | Ver     | 2x2x5                                  | properties studied: critical behavior of the soft<br>mode.<br>publication:<br>Y. Yacoby, W. W. Kruhler and S. Just Phys. Rev. B13<br>4132 (1976).                                                                                                                                                                                          | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| TiC                                                                   | Z       | 10x10x90                               | .Purity > 99.9%<br>.Elastic constants and Ultrasound absorp-<br>tion experiment.                                                                                                                                                                                                                                                                                                                                                                                                                                          | +                                    |
| VC                                                                    | Z       | 10x10x90                               | .High temperature properties (Electric<br>resistivity, Thermoelectric power, Work<br>function and Hardness)                                                                                                                                                                                                                                                                                                                                                                                                               | +                                    |
| NbC                                                                   | Z       | 7x7x50                                 | .Chemical analysis, X-ray fluorescence<br>analysis, EMX, ESCA, Lattice parameter,<br>Optical microscopy and X-ray topography.                                                                                                                                                                                                                                                                                                                                                                                             | -                                    |
| ZrC                                                                   | Z       | 5x5x5                                  | .Point emitter<br>.J. Less-Common Metals. <u>32</u> (1973) 21.<br>.Japan. J. Appl. Phys. <u>15</u> (1976) 921; <u>12</u> (1973)<br>1462; Suppl. 2, Part 1 (1974) 289.<br>.Ceramics (in Japanese) <u>11</u> (1976) 1073.<br>.Phys. Rev. B <u>12</u> (1975) 5465.<br>.Internal Friction and Ultrasonic<br>Attenuation in Solids. (University of Tokyo<br>Press, Tokyo, 1977) p. 395.<br>.Oyo Buturi (in Japanese) <u>45</u> (1976) 607.<br>.Surface Science. <u>62</u> (1977) 313.<br>.J. Mater. Sci. <u>12</u> (1977) 595. | -                                    |
| NbN                                                                   | Z       | 10x10x90                               | .Superconducting device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Si, Silicon<br>(single crystal)                                       | Z, Cz   |                                        | Characterization of impurities by photo-luminescence (PL) method.<br>► Nondestructive detection of extremely small amount of impurities. (detection limit; $1 \times 10^{11} \text{ cm}^{-3}$ for B, $5 \times 10^{11} \text{ cm}^{-3}$ for P)<br>► Analysis of compensating impurities.<br>► Determination of impurity concentration from PL spectra. (calibration curve for B and P; $10^{11} - 10^{15} \text{ cm}^{-3}$ )<br>► Ref.: Appl. Phys. Letters, <u>32</u> , 719. |                                      |

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Telephone: 0583-82-1201

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)  | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.      | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| TiB <sub>2</sub> whiskers<br>bulk single crystal                      | VP<br>" | ~250 $\mu\text{m}$<br>0.1x5x5mm<br>max. | Au doped, <100>, Bull. Chem. Soc. Japan, 48(1975)3156.<br>By modified hot-filament method. J. Cryst. Growth, 43(1978)533. | -<br>-                               |
| ZrB <sub>2</sub> whiskers                                             | "       | ~500 $\mu\text{m}$                      | Au doped, <100>, Denki Kagaku, 43(1975)323.                                                                               | -                                    |
| Nb <sub>2</sub> coatings                                              | "       |                                         | J. Cryst. Growth, 30(1975)233.                                                                                            | -                                    |
| LaB <sub>6</sub> whiskers and bulk single crystal                     | "       | ~5 mm long                              | J. Cryst. Growth, 44(1978)106.                                                                                            | -                                    |
| TiP whiskers                                                          | "       | ~10 mm long                             | Au, Pt doped, <001>, J. Electrochem. Soc., 123(1976)290.                                                                  | -                                    |
| ZrP whiskers                                                          | "       | ~5 mm long                              | Au, Pt doped, <100>, J. Cryst. Growth, 30(1975)1.                                                                         | -                                    |
| NbP whiskers                                                          | "       | ~5 mm long                              | Au, Pt doped, <001>, Bull. Chem. Soc. Japan, 49(1976)2122.                                                                | -                                    |
| BP whiskers                                                           | "       | ~4 mm long                              | Ni, Pt doped, <111>, Bull. Chem. Soc. Japan, 48(1975)3161.                                                                | -                                    |
| TiN bulk single crystal                                               | "       | 2x2x2mm max.                            | By modified hot-filament method. J. Cryst. Growth, 32(1976)141.                                                           | -                                    |
| ZrN bulk single crystal                                               | "       | 3x3x3mm max.                            | Ditto                                                                                                                     | -                                    |
| TiC bulk single crystal                                               | "       | 6x6x6mm max.                            | Ditto                                                                                                                     | -                                    |
| ZrC bulk single crystal                                               | "       | 2x2x2mm max.                            | Ditto                                                                                                                     | -                                    |
| ZrS <sub>2</sub> pillar-like crystals                                 | "       | ~2 mm long                              | Hollow crystals. J. Cryst. Growth, 33(1976)116.                                                                           | -                                    |
| TiS <sub>2</sub>                                                      | "       |                                         | Bull. Chem. Soc. Japan, 51(1978) to be published.                                                                         | -                                    |
| NbO whiskers                                                          | "       | ~1 mm long                              | Pd doped, <100>, Yogyo Kyokai-Shi, 83(1975)510.                                                                           | -                                    |
| B <sub>4</sub> Si whiskers                                            | "       | ~2 mm long                              | Au doped, Bull. Chem. Soc. Japan, 48(1975)1463.                                                                           | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Cr}_2\text{O}_3$<br>Chromic oxide                              | VP      | 10x10x.02                              | This material is very thin(transparent),<br>uniformly thick and highly perfect plate,<br>therefore, this can be used as Faraday rotator.<br>Published in J. Crystal Growth, 43(1978)645 | +                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Al}_2\text{O}_3$ , Alumina, Corundam,<br>Aluminum Oxide        | Flu     | 10x50x50                               | about 98% purity, [10 $\bar{1}$ 2] plate-like crystal<br>$\text{Fe}_2\text{O}_3$ , $\text{Cr}_2\text{O}_3$ , $\text{La}_2\text{O}_3$ , $\text{Nd}_2\text{O}_3$ , $\text{Yb}_2\text{O}_3$ , $\text{Dy}_2\text{O}_3$ ,<br>$\text{Y}_2\text{O}_3$ , $\text{TiO}_2$ , $\text{Ni}_2\text{O}_3$ .<br>etch pits, surface topography, inclusion<br>twin, habit change.<br>J. Crystal Growth 24/25 666(1974), 32 316<br>(1976), 41 1(1977), 42 293(1977). | -                                    |
| $\text{BaFe}_2\text{O}_4$ , Barium Ferrite                            | M       | 0.1x1x2                                | 99% up, plate-like, surface micro-<br>topography                                                                                                                                                                                                                                                                                                                                                                                                 | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| BP (Boron Phosphide)                                                  | GE*     | 10x10x0.05                             | Orientation = (100)<br>Si Doped n-type<br>$\rho \approx 0.5 \Omega \text{ cm}$<br>electron density $\approx 10^{17} \text{ cm}^{-3}$ (non doped)<br>$10^{19} \text{ cm}^{-3}$ (doped)<br><br>* Grown on Si and Si-removed.<br>** if neccessary, it is available, but expensive. | (-)**                                |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Bi}_4\text{Ce}_3\text{O}_{12}$ (BGO)                           | Cz      | $38\phi \times 250\text{L}$            | None dope, Extra High purity for X-ray<br>and Gamma-ray SCINTILLATORS.                                               | +                                    |
| $\text{LiTaO}_3$                                                      | Cz      | $38\phi \times 250\text{L}$            | High purity for Surface Acoustic Wave<br>Devices.                                                                    | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)       | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{LiNbO}_3$                                                                                                                                                                                                                                                                                                                                  | Cz      | $75\phi \times 200$                          | Nondoped [Z], [X], [Y] direction.                                                                                    | -                                    |
|                                                                                                                                                                                                                                                                                                                                                   | Cz      | $10\phi \times 150$                          | Rh, Fe, Rh+Cu doped. [Z] direction.                                                                                  | -                                    |
| $\text{Bi}_{12}\text{SiO}_{20}$                                                                                                                                                                                                                                                                                                                   | Cz      | $10\phi \times 200$                          | [001] direction.                                                                                                     | -                                    |
| $(\text{Sr}_{0.75}\text{Ba}_{0.25})\text{Nb}_2\text{O}_6$                                                                                                                                                                                                                                                                                         | Cz      | $30\phi \times 200$                          | [001] direction. Ce doped. Congruent melt.                                                                           | -                                    |
| $\text{TeO}_2$                                                                                                                                                                                                                                                                                                                                    | Cz      | $10\phi \times 100$                          | [001] direction. Nondoped.                                                                                           | -                                    |
| $\text{Gd}_2(\text{MoO}_4)_3$                                                                                                                                                                                                                                                                                                                     | Cz      | $25\phi \times 200$                          | [001], [100], [110] direction. Nondoped, Er,<br>Cr, Dy doped.                                                        | -                                    |
| $\text{PbMoO}_4$                                                                                                                                                                                                                                                                                                                                  | Cz      | $15\phi \times 200$                          | [001] direction.                                                                                                     | -                                    |
| $\text{CaF}_2$                                                                                                                                                                                                                                                                                                                                    | Cz      | $10\phi \times 100$                          | [001] direction. Nondoped, Sm doped.                                                                                 | -                                    |
| $\text{Li}_2\text{Nd}_4(\text{MoO}_4)_3$                                                                                                                                                                                                                                                                                                          | Cz      | $15\phi \times 70$                           | [001] direction. Nondoped.                                                                                           | -                                    |
| $\text{NaNbO}_3$                                                                                                                                                                                                                                                                                                                                  | Br      | $200\phi \times 100$                         |                                                                                                                      | -                                    |
| $\text{ZnS}$                                                                                                                                                                                                                                                                                                                                      | Br      | $15\phi \times 70$                           |                                                                                                                      | -                                    |
| $\text{CdS}$                                                                                                                                                                                                                                                                                                                                      | Br      | $15\phi \times 70$                           |                                                                                                                      | -                                    |
| $\text{BaTiO}_3$ , $\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}:\text{Cr}$ ,<br>$\text{Y}_3\text{Al}_5\text{O}_{12}:\text{Nd}$ , $\text{VO}_2$ , $\text{PbFe}_{12}\text{O}_{19}$ ,<br>$\text{NiCr}_2\text{O}_4$ , $\text{Al}_2\text{O}_3$ , $\text{Y}_3\text{Fe}_5\text{O}_{12}$ ,<br>$\text{NdP}_5\text{O}_{14}$ , $\text{YP}_5\text{O}_{14}$ | Flu     | $\sim 10 \times \sim 10 \times$<br>$\sim 10$ |                                                                                                                      | -                                    |

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|------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| SbSI                                                                                                       | Vp      |                                        |                                                                                                                      | -                                    |
| CdS                                                                                                        | Vp      |                                        |                                                                                                                      | -                                    |
| $\text{Li}(\text{N}_2\text{H}_5)\text{SO}_4$                                                               | Sol     | 30x20x10                               |                                                                                                                      | -                                    |
| $\text{Ca}_2\text{Sr}(\text{CH}_3\text{CH}_2\text{COO})_6$                                                 | Sol     | 30x30x20                               |                                                                                                                      | -                                    |
| $\text{C}(\text{NH}_2)_3\text{Al}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$                                | Sol     | 30x30x5                                | GASH.                                                                                                                | -                                    |
| $(\text{NH}_4)_2\text{SO}_4$                                                                               | Sol     | 20x20x10                               |                                                                                                                      | -                                    |
| $\text{KNaC}_2\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$                                              | Sol     | 30x30x10                               |                                                                                                                      | -                                    |
| $(\text{NH}_2\text{CH}_2\text{COOH})_3\text{H}_2\text{SO}_4$                                               | Sol     | 100x100x10                             | b-plate. TGS.                                                                                                        | -                                    |
|                                                                                                            |         | 70x50x30                               | Euhedral crystal. TGS.                                                                                               | -                                    |
| $\text{KH}_2\text{PO}_4$                                                                                   | Sol     | 50x20x20                               | KDP.                                                                                                                 | -                                    |
| $\text{NH}_4\text{Cl}$                                                                                     | Sol     | 15x15x5                                |                                                                                                                      | -                                    |
| $\text{HIO}_3$                                                                                             | Sol     | 15x15x5                                |                                                                                                                      | -                                    |

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|-------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
| $\text{CaB}_6$ , $\text{SrB}_6$                                                                       | Flu     | 0.2x0.2x15                             | Hexaboride and tetraboride single crystals were grown by a molten aluminum flux method                                                                                                                                                                                                                                 |                                      |
| $\text{BaB}_6$                                                                                        | Flu     | 0.2x0.2x3                              |                                                                                                                                                                                                                                                                                                                        |                                      |
| $\text{LaB}_6$ , $\text{CeB}_6$ , $\text{PrB}_6$                                                      | Flu     | 0.2x0.2x15                             | Properties studied: Hardness                                                                                                                                                                                                                                                                                           |                                      |
| $\text{NdB}_6$ , $\text{SmB}_6$ , $\text{EuB}_6$                                                      | Flu     | 0.1x5x5                                | Electron emission properties                                                                                                                                                                                                                                                                                           | -                                    |
| $\text{YB}_4$ , $\text{GdB}_4$ , $\text{DyB}_4$ ,<br>$\text{HoB}_4$ , $\text{ErB}_4$ , $\text{TmB}_4$ | Flu     | 0.3x0.3x3                              | Publications:<br>T. Aita, U. Kawabe, and Y. Honda, Japan J. Appl. Phys. 13 (1974) 391<br>M. Futamoto, T. Aita, and U. Kawabe, Japan J. Appl. Phys. 14 (1975) 1263<br>H. Okano, M. Futamoto, S. Hosoki, and U. Kawabe, Shinku 20 (1977) 127<br>M. Futamoto, S. Hosoki, H. Okano, and U. Kawabe, J. A. P. 48 (1977) 3541 |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)   | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $(Y Sm)_3(Fe Ga)_5O_{12}$                                             | <u>LE</u> | Dia.: 50mm<br>Thickness:<br>2~10 $\mu$ m | (111), Magnetic Bubble, Bubble Dia. 5 $\mu$ m                                                                        | +                                    |
| $(Y Sm Lu)_3(Fe Ga)_5O_{12}$                                          | <u>LE</u> | //                                       | (111), Magnetic Bubble, Bubble Dia. 2~5 $\mu$ m                                                                      | +                                    |
| $(Y Sm Lu Ca)_3(Fe Ge)_5O_{12}$                                       | <u>LE</u> | //                                       | //                                                                                                                   | +                                    |
| $(Y Eu Lu Ca)_3(Fe Ge)_5O_{12}$                                       | <u>LE</u> | //                                       | //                                                                                                                   | +                                    |
| $(Y Er Ca)_3(Fe Ge)_5O_{12}$                                          | <u>LE</u> | //                                       | //, g-factor > 10, high wall velocity                                                                                | -                                    |
| $(La Tm Ca)_3(Fe Ge)_5O_{12}$                                         | <u>LE</u> | //                                       | //, g-factor > 10, high wall velocity                                                                                | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*          | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $Nb_{1-x}Ta_x$ (x=0.0—0.3)                                            | Stress<br>anneal | 20x20x20                               | Superconductor, Single crystal, (110) cut, $H_{c2}$ anisotropy<br>J. Low Temp. Phys. <u>15</u> , 231, (1974)         | -                                    |
| Nb                                                                    | <u>Z</u>         | 8 mm dia.<br>sphere                    | Superconductor, Single crystal, $H_{c1}$ anisotropy<br>To be published in J. Phys. Soc. Japan (1978)                 | -                                    |
| V                                                                     | <u>Z</u>         | //                                     | //                                                                                                                   | -                                    |
| $Pb_{1-x}In_x$ (x=0.0 -- 0.2)                                         | <u>Br</u>        | 6mm dia x<br>10 l.                     | Superconductor, Single crystal, $H_{c2}$ anisotropy, $T_c$<br>J. Low Temp. Phys. <u>27</u> , 125, (1976)             | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $Gd_3Ga_5O_{12}$ (GGG)                                                | Cz      | 50 in dia.<br>x50                      | Boule axis: $\langle 111 \rangle$<br>$\langle 100 \rangle \langle 110 \rangle$<br>Dislocation: less than 3 per wafer<br>Inclusion free                                                                                                                                                                                     | +<br>-                               |
| $Bi_4Ge_3O_{12}$ (BGO)                                                | Cz      | 35 in dia.<br>x 50                     | Boule axis: $\langle 100 \rangle$<br>Application: scintillator<br>(photon peak pulse height: 12% vs NaI)                                                                                                                                                                                                                   | +                                    |
| $LaB_6$                                                               | Z       | 1 in dia.<br>x 30                      | Axis: $\langle 100 \rangle$<br>Application: electron emission source<br>(A $LaB_6$ single crystal is grown by a laser<br>heated floating zone method.)<br><br>Publications:<br>(GGG) J. Crystal Growth <u>32</u> (1976) 89.<br>J. Crystal Growth <u>38</u> (1977) 206.<br>( $LaB_6$ ) J. Crystal Growth <u>40</u> (1977) 1 | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $Gd_5Ga_3O_{12}$ (GGG)                                                | Cz      | $\phi$ 50 x 50                         | Orientation [111]                                                                                                   | +                                    |
| $Gd_2(MoO_4)_3$ (MOG)                                                 | Cz      | $\phi$ 30 x 200                        | Orientation [110]                                                                                                   | +                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tantalum-triselenide; $TaSe_3$                                        | VP      | $(10^{-2})^2 \times 10$                | resistance ratio $\sim 100$ , $\langle 010 \rangle$<br>superconducting properties                                    | +                                    |
| Tantalum-trisulphides; $TaS_3$                                        | same    | same                                   | $\langle 001 \rangle$ semiconducting below $\sim 200$ K                                                              | +                                    |
| Niobium-triselenide; $NbSe_3$                                         | same    | same                                   | resistance ratio $\sim 100$ , $\langle 010 \rangle$<br>conductivity anomalies                                        | +                                    |
| Niobium-trisulphide; $NbS_3$                                          | same    | same                                   | semiconducting                                                                                                       | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $Kl_3(SeO_3)_2$<br>$KD_3(SeO_3)_2$<br>$RbH_3(SeO_3)_2$<br>$RbD_3(SeO_3)_2$<br>KDP<br>DKDP | Sol     | More than<br>10 x 10 x 10              |                                                                                                                      |                                      |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $GeO_2$                                                               | VP      | 6x0.01x0.01                            | S.Ito, K.Kodaira, T.Matsushita, Mat.Res.Bull, 13(2)<br>97 (1978)                                                           |                                      |
| $SnO_2$                                                               | VP      | 47x0.08x0.08                           | T.Matsushita, H.Kataoka, A.Tsunashima, K.Kokaira,<br>Yogyo Kyokai shi, 84(3), 147 (1976)                                   |                                      |
| $Zn_2GeO_4$                                                           | VP      | 15x0.04x0.04                           | S.Ito, K.Kodaira, T.Matsushita, J.Chemical Society<br>of Japan, Chemistry and Industrial Chemistry,<br>No.9 (1976) pp.1372 |                                      |
| $Zn_2SnO_4$                                                           | VP      | 50x0.01x0.01                           | R.Yoshida, Y.Yoshida, I.Yamai, K.Kodaira, T.Matsushita,<br>J.Crystal Growth, 36(1), 181 (1976)                             |                                      |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $SnO_2$ (tin oxide)                                                   | Flu     | 15x0.4x0.4                             | Chem. Lett., (1976) pp.235                                                                                           |                                      |
| $TiO_2$ (rutile)                                                      | Flu     | 12x0.1x0.1                             | growth direction c-axis, main faces {110}                                                                            | } unpublished                        |
| $ZrO_2$ (zirconia)                                                    | Flu     | 4x0.3x0.3                              | growth direction c-axis, main faces {100}{110}                                                                       |                                      |
| $HfO_2$ (hafnia)                                                      | Flu     | 11x0.6x0.6                             | growth direction c-axis, main faces {100}                                                                            |                                      |
| $TiO_2$                                                               | Flu     | 25x3x3                                 | } J. Crystal Growth, 41(2), 317 (1977)                                                                               | } unpublished                        |
| $Bi_4Ti_3O_{12}$                                                      | Flu     | 15x1x1                                 |                                                                                                                      |                                      |
| $Bi_2Ti_4O_{11}$                                                      | Flu     | 15x1x1                                 |                                                                                                                      |                                      |
| $Bi_2Ti_2O_7$                                                         | Flu     | 10x10x6                                |                                                                                                                      |                                      |
| $SnO_2$                                                               | Flu     | 1x1x0.1                                | growth direction c-axis                                                                                              |                                      |
| $Zn_2SnO_4$                                                           | Flu     | 3x3x3                                  | main faces {111}                                                                                                     |                                      |
| $Mg_2SnO_4$                                                           | Flu     | 1x1x1                                  | main faces {111}                                                                                                     |                                      |
| $Bi_2Sn_2O_7$                                                         | Flu     | 4x4x4                                  | main faces {111}                                                                                                     |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Li <sub>2</sub> CdPb                                                  | M       | 10x10x15                               | polycrystalline: crystal structure<br>determination<br>Japan. J. Appl. Phys. <u>12</u> 743 (1973)                                                                                                                                                                    | -                                    |
| LiIn                                                                  | Br      | 6x5x5-<br>10x10x15                     | (111) orientation: single crystal growth<br>J. Cryst. Growth <u>23</u> 160 (1974)<br>Field emission study (Fowler-Nordheim plots)<br>J. Appl. Phys. <u>47</u> 3754 (1976)<br>Elastic properties (Elastic const. Debye<br>temp.)<br>Phys. Rev. <u>B13</u> 1528 (1976) | -                                    |
| LiAl                                                                  | M       | 10x10x15                               | Neutron diffraction study<br>Acta Crystallogr. <u>B31</u> 1793 (1975)<br>Applications: solid blanket for nuclear<br>fusion, and electrode material                                                                                                                   | +                                    |
| NaTl-structure<br>(NaTl, NaIn, LiIn, LiAl, and<br>LiZn)               | M       | 10x10x15                               | Elastic properties (Elastic moduli, Debye<br>temp.) (to be published)                                                                                                                                                                                                | -                                    |
| Li <sub>2</sub> ZnGe                                                  | Sol     | 5x5x8                                  | (111) orientation: single crystal growth,<br>semiconductor<br>J. Cryst. Growth (in press)                                                                                                                                                                            | +                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KDP                                                                   | Sol.    | 20x20x40                               | Properties Studied                                                                                                   |                                      |
| TGS                                                                   | Sol.    | 40x40x20                               |                                                                                                                      |                                      |
| ADP                                                                   | Sol.    | 20x20x40                               |                                                                                                                      |                                      |
| RS                                                                    | Sol.    | 20x30x50                               |                                                                                                                      |                                      |

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|----------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Cu-Al Alloy Single Crystal<br>0.1 at.%Al<br>0.2 at.%Al<br>0.3 at.%Al<br>0.4 at.%Al<br>0.8 at.%Al<br>1.6 at.%Al | Cz      | about<br>30φ x 60                      | Materials<br>99.99 %Cu Zone Melting (three times)<br>99.999%Al<br>Yield stress is measured at 1.4~300 K.             | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$                             | <u>sol</u> | 30                                     | For dielectric studies.                                                                                              | -                                    |
| $\text{SnCl}_2 \cdot 2\text{D}_2\text{O}$                             | <u>sol</u> | 20                                     | For dielectric and high pressure studies.                                                                            | -                                    |
| $\text{AgNO}_2$                                                       | <u>sol</u> | 3 - 8                                  | For dielectric studies.                                                                                              | -                                    |
| $\text{AgNa}(\text{NO}_2)_2$                                          | <u>sol</u> | 5 - 10                                 | For dielectric studies.                                                                                              | -                                    |
| $\text{Ba}(\text{NO}_2)_2 \cdot \text{H}_2\text{O}$                   | <u>sol</u> | 20                                     | Hex. plsm. For pyroelectric studies.                                                                                 | -                                    |
| $\text{X}_2\text{SnY}_6$ (X=K, NH <sub>4</sub> , Y=Cl, Br)            | <u>sol</u> | 2 - 5                                  | For studies of phase transitions.                                                                                    | -                                    |
| $(\text{NH}_4)_3\text{H}(\text{SO}_4)_2$                              | <u>sol</u> | 20 x 1                                 | Hex. plates. For dielectric studies.                                                                                 | -                                    |
| $(\text{ND}_4)_3\text{D}(\text{SO}_4)_2$                              | <u>sol</u> | 10 x 1                                 | Hex. plates. For dielectric studies.                                                                                 | -                                    |
| $(\text{NH}_4)_3\text{H}(\text{SeO}_4)_2$                             | <u>sol</u> | 10 x 0.5                               | Hex. plates. For dielectric studies.                                                                                 | -                                    |
| $\text{Rb}_2\text{ZnY}_4$ (Y = Cl, Br)                                | <u>sol</u> | 10 x 3                                 | For neutron scattering studies.                                                                                      | -                                    |
| $\text{SC}(\text{ND}_2)_2$                                            | <u>sol</u> | 30                                     | Aggregation of oriented crystallites. For neutron scattering studies.                                                | -                                    |
| $\text{SC}(\text{ND}_2)_2$                                            | <u>sol</u> | 5 x 2                                  | Transparent single crystals. For dielectric studies.                                                                 | -                                    |
| $\text{CsH}_2\text{PO}_4$                                             | <u>sol</u> | 10                                     | For dielectric studies.                                                                                              | -                                    |
| $\text{CsD}_2\text{PO}_4$                                             | <u>sol</u> | 8 x 2                                  | For dielectric and high pressure studies.                                                                            | -                                    |
| $\text{NH}_4\text{H}_2\text{AsO}_4$                                   | <u>sol</u> | 10 x 3                                 | For dielectric studies.                                                                                              | -                                    |

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|------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{Ga}_{1-x}\text{Al}_x\text{As}$ film with uniform composition in depth | LE      | 0.1-10um<br>in thickness               | Electron density $< 10^{16} \text{ cm}^{-3}$                                                                         |                                      |
| $\text{InAs}_{1-x}\text{P}_x$ film                                           | VP      | 2 - 10 um<br>in thickness              | Carrier density $< 10^{16} \text{ cm}^{-3}$                                                                          |                                      |
| CdTe on Te substrate                                                         | VLS     | 1 - 100um<br>in thickness              | single crystal with (110) on Te substrate with (100) direction. Surface carrier density $< 10^{15} \text{ cm}^{-3}$  |                                      |
| ZnTe film                                                                    | VP      | 1 - 10 um<br>in thickness              | This work is started at May.1978.                                                                                    |                                      |

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|-------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| CdIn <sub>2</sub> S <sub>4</sub><br>CdIn <sub>2</sub> Se <sub>4</sub><br>AgGaS <sub>2</sub><br>CuInS <sub>2</sub> | Br      | W x H x L<br>10 x 5 x 30               | Far-Infrared Spectroscopy<br>Normal and Resonant Light Scattering<br>Lattice Vibration in CdIn <sub>2</sub> S <sub>4</sub><br>K. Yamamoto, T. Murakawa, Y. Ohbayashi, H. Shimizu<br>and K. Abe; J. Phys. Soc. Japan 35, 1258 (1973)<br>Lattice Vibration in Spinel-Type CdIn <sub>2</sub> S <sub>4</sub><br>H. Shimizu, Y. Ohbayashi, K. Yamamoto, K. Abe<br>; J. Phys Soc. Japan 38, 750 (1975)<br>Single Crystal Growth of CdIn <sub>2</sub> S <sub>4</sub><br>H. Kasahara, K. Abe, K. Yamamoto; Memoirs of the<br>Faculty of Engineering, Kobe University No. 23<br>(1977) |                                      |

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|---------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.       | Material<br>Avail-<br>ability<br>+ - |
| sputtered amorphous Si.<br>sputtered or evaporated amorphous Ge.<br>evaporated amorphous Ga <sub>x</sub> P <sub>1-x</sub> |         | 50x50x10 <sup>-2</sup>                 | dopant: Al, P. properties studied: ESR, conductivity<br>optical absorption, photo-conductivity, thermo-<br>electric-power. |                                      |

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|-------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                   | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| NiS (Beta Nickel Sulfide)                                                                                               | <u>M</u>   | 5x5x5                                  | Compressibility and Metal-Nonmetal Tran-<br>sition Point (S. Anzai and K. Ozawa, J. Appl.<br>Phys. 6 2139 (1977).)   | -                                    |
| Ni <sub>1-x</sub> S (Beta Nickel Sulfide)                                                                               | <u>Sub</u> | 3x3x(<0.1)                             |                                                                                                                      | -                                    |

| 360                                                                                                  |         |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ag                                                                                                   | GE      |                                        | Crystal growth mechanism                                                                                             | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                                            | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZrO <sub>2</sub>                                                      | Elec-<br>tro-<br>depo-<br>sition<br>from<br>plasma | 0.5φ×1.0                               | In Vacuum; ZrO <sub>2</sub> (monoclinic)+ Zr(α), O/Zr~1.95<br>In Oxygen; ZrO <sub>2</sub> (monoclinic) transparent,<br>O/Zr~2.00<br>Asahi Garasu Kogyo Gijitsu Shorei-kai,<br>Kenkyu Hokoku 29 30(1977)         | -<br><br>-                           |
| HfO <sub>2</sub>                                                      | Elec-<br>tro-<br>depo-<br>sition<br>from<br>plasma | 0.5φ×0.2                               | In Vacuum; HfO <sub>2</sub> (monoclinic)+ ? , O/Hf~1.95<br>In Oxygen; HfO <sub>2</sub> (monoclinic) transparent,<br>O/Hf~2.00<br>Proc. of the 2nd Symp. on Ion Source and<br>Application Technology P.165(1978) | -<br><br>-                           |

362

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|-----------------------------------------------------------------------|-----------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1. Silicon Carbide (SiC)                                              |           |                                        |                                                                                                                                                 |                                      |
| 6H-SiC                                                                | <u>LE</u> | 5×5×0.02                               | (0001), Al, Ga, B, N, photoluminescence,<br>Hall effects, blue light-emitting-diodes.                                                           | -                                    |
| 6H-SiC                                                                | <u>VP</u> | 5×5×0.02                               | (0001), Al, N, electrical properties,<br>photoluminescence.                                                                                     | -                                    |
| 3C-SiC                                                                | <u>VP</u> | 10×10×0.005                            | (100), (110), (111), heteroepitaxy,<br>electrical properties, optical properties,<br>photoelectric devices.                                     | -                                    |
| 2. PLZT((Pb,La)(Zr,Ti)O <sub>3</sub> )                                | <u>GE</u> | 10×10×0.005                            | (100), (111), heteroepitaxial growth,<br>optical properties, electro-optic effects,<br>ferroelectricity, optical waveguide,<br>light modulator. | +                                    |

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|-----------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdTe Cadmium Telluride                                                | <u>Br</u> | 13 <sup>φ</sup> × 40                   | 6N, doped with Al and P,<br>electrical properties, photoluminescence<br>deep level spectroscopy                      | -                                    |
|                                                                       | <u>LE</u> | 10 × 10 × 0.05                         | (111), (100), doped with Cl<br>photo and electroluminescence<br>J. Crystal Growth 43(1978)13                         | -                                    |
| ZnS Zinc Sulfide                                                      | <u>GE</u> | 5 <sup>φ</sup> × 0.05                  | (111), (100), photoluminescence<br>to be reported at ICVGE (1978), Nagoya, JAPAN                                     | -                                    |
| ZnSe Zinc Selenide                                                    | <u>GE</u> | 5 <sup>φ</sup> × 0.05                  | (111), (100), photoluminescence                                                                                      | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| TiN                                                                   | VP      | whisker                                | J. Cryst. Growth <u>29</u> , 55(1975)                                                                                | -                                    |
| TiC                                                                   | VP      | whisker                                | J. Cryst. Growth <u>37</u> , 293(1977)                                                                               | -                                    |
| ZrN                                                                   | VP      | whisker                                | Nippon Kagaku Kaishi, <u>1978</u> , (666)(1978)                                                                      | -                                    |
| ZrC                                                                   | VP      | whisker                                | { J. Less-Common Metals, <u>58</u> , 147(1978)<br>Nippon Kagaku Kaishi, <u>1977</u> , 650(1977)                      | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Li <sub>2</sub> O                                                     | M       | 3 × 3 × 1                              | Measurement of self-diffusion coefficients                                                                           | (-)                                  |

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                    | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                           | Material<br>Avail-<br>ability<br>+ - |
| ZnTe                                                                                                                                                                                     | VP      | 13×4×3                                 | undoped P-type crystal in a closed tube with iodine as a transport agent $\rho=10^4\sim10^6\Omega\text{cm}$ at 300K<br>Japan. J. appl. Phys. <u>16</u> (1977) 1541                             | -                                    |
| $\text{Ga}_x\text{Al}_{1-x}\text{Sb}$                                                                                                                                                    | VP      | 5×5×0.15                               | undoped P-type epi-layer on (111) GaSb in a closed tube with iodine as a transport agent<br>$P\approx 10^{18}\text{cm}^{-3}$<br>$0.1 < x \leq 1$<br>Japan. J. appl. Phys. <u>17</u> (1978) 739 | -                                    |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| HgS (black, metacinnabarite)                                                                                                                                                         | VP      | 0.4×0.5<br>× 0.1                       | unknown                                                                                                              | -                                    |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
| ZnSe                                                                                                                                                                        | Br      | 8 $\phi$ x 60                          | Purity of starting material; 99.999 % (Merck's powder).<br>Impurity in undoped crystals; (a) Mg, Fe, Ni and Cu were detected by atomic absorption analysis. (b) Cr (0.6ppm), Co (8ppb), Cu (0.4ppm), Ag (30ppb), Sb (6ppb) and Au (0.07ppb) were determined by substoichiometric neutron activation analysis.<br>Dopants; Al, In and Ga.<br>Properties studied; photoluminescence** and electroluminescence.**<br>Characterization; crystal imperfections (lineages, voids and twins),*** resistivity, carrier concentration.<br>Applications; blue-LED**<br>Publications; *Japan. J. appl. Phys. <u>17</u> (1978) 335. **J. Appl. Phys. <u>48</u> (1977) 196, 5237. Japan. J. appl. Phys. <u>16</u> (1977) 77. *** J. Cryst. Growth <u>41</u> (1977) 103. | +                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|------|------------------------|------|------------------------|------|---|--------------------------------------|---|-----|-----|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. |      |                        |      |                        |      |   | Material<br>Avail-<br>ability<br>+ - |   |     |     |
| InP, Indium phosphide                                                 | Sol     | 30 <sup>φ</sup> x 25                   | undoped single crystals                                                                                              |      |                        |      |                        |      |   | -                                    |   |     |     |
|                                                                       |         |                                        | 1. Purity: mass spectroscopic data (ppm).                                                                            |      |                        |      |                        |      |   |                                      |   |     |     |
|                                                                       |         |                                        | Ca                                                                                                                   | Fe   | Cu                     | Zn   | Cl                     | Al   | O |                                      | C | N   | Si  |
|                                                                       |         |                                        | 0.1                                                                                                                  | 0.04 | 0.09                   | 0.04 | 0.03                   | 0.08 | 5 |                                      | 1 | 0.1 | 0.1 |
|                                                                       |         |                                        | 2. Electrical properties.                                                                                            |      |                        |      |                        |      |   |                                      |   |     |     |
|                                                                       |         |                                        |                                                                                                                      |      |                        |      |                        |      |   |                                      |   |     |     |
|                                                                       |         |                                        |                                                                                                                      |      |                        |      | 77°K                   | R.T. |   |                                      |   |     |     |
|                                                                       |         |                                        | N <sub>D</sub> -N <sub>A</sub> (cm <sup>-3</sup> )                                                                   |      | 3.1 x 10 <sup>15</sup> |      | 4.0 x 10 <sup>15</sup> |      |   |                                      |   |     |     |
|                                                                       |         |                                        | Mobility (cm <sup>2</sup> /Vsec)                                                                                     |      | 4.0 x 10 <sup>4</sup>  |      | 4.5 x 10 <sup>3</sup>  |      |   |                                      |   |     |     |
|                                                                       |         |                                        | 3. Crystallinity.                                                                                                    |      |                        |      |                        |      |   |                                      |   |     |     |
|                                                                       |         |                                        | The cell structure was observed: low-angle boundaries surrounded areas almost free from dislocations.                |      |                        |      |                        |      |   |                                      |   |     |     |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GaAs <sub>1-x</sub> Sb <sub>x</sub>                                   | MBE*)   | 10 x 12<br>x 3 μm                      | GaAs <sub>1-x</sub> Sb <sub>x</sub> (001) on GaAs(001) substrates<br>MEED, AES, X-ray diffraction, 0.3<X<0.9<br>Japan. J. Appl. Phys. <u>16</u> (1977) 1875<br>*) Molecular Beam Epitaxy |                                      |

| <b>371</b><br>Name(s): M. Aono, C. Oshima, R. Nishitani, T. Tanaka, E. Bannai, and S. Kawai<br>Inst. & Address: National Institute for Research in Inorganic Materials<br>Namiki 1-1, Sakura-mura, Niihari-gun, Ibaraki 300-31, JAPAN Telephone: 0298-51-3351 |                      |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                         | METHOD*              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| LaB <sub>6</sub> (Lanthanum hexaboride)<br>SmB <sub>6</sub> (Samarium hexaboride)                                                                                                                                                                             | <u>Z</u><br><u>Z</u> | 5×5×40 mm <sup>3</sup>                 | <p>LaB<sub>6</sub> is an excellent electron emitter because of its unusually low work function, and SmB<sub>6</sub> is a remarkable compound in that it contains both Sm<sup>3+</sup> and Sm<sup>2+</sup> ions in a ratio of ~7:3.</p> <p>The atomic and electronic structures of the (001) surfaces of LaB<sub>6</sub> and SmB<sub>6</sub> have been studied by angle-resolved X-ray and ultraviolet photoelectron spectroscopy, low-energy electron diffraction, work-function measurements, and low-energy ion scattering spectroscopy:<br/> M. Aono, T. Tanaka, E. Bannai, C. Oshima, and S. Kawai, Phys. Rev. B <u>16</u>, 3489 (1977).<br/> M. Aono, T. Tanaka, E. Bannai, and S. Kawai, Appl. Phys. Lett. <u>31</u>, 323 (1977).<br/> M. Aono, C. Oshima, T. Tanaka, E. Bannai, and S. Kawai, J. Appl. Phys. (April, 1978).<br/> M. Aono, R. Nishitani, C. Oshima, T. Tanaka, E. Bannai, and S. Kawai (Proc. Intern. Conf. Solid Films and Surfaces, Tokyo, 1978).</p> |                                      |

| <b>372</b><br>Name(s): Noboru Kimizuka<br>Inst. & Address: National Institute for Researches in Inorganic Materials<br>Sakuramura, Niihari-gun, Ibaraki, 300-31, Japan Telephone: 0298-51-3351                                                                                                                                                                                              |                       |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                                       | METHOD*               | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| YFe <sub>2</sub> O <sub>4</sub> , HoFe <sub>2</sub> O <sub>4</sub> , ErFe <sub>2</sub> O <sub>4</sub> , YbFe <sub>2</sub> O <sub>4</sub> ,<br>TmFe <sub>2</sub> O <sub>4</sub> , LuFe <sub>2</sub> O <sub>4</sub> , Yb <sub>2</sub> Fe <sub>3</sub> O <sub>7</sub> ,<br>Lu <sub>2</sub> Fe <sub>3</sub> O <sub>7</sub>                                                                      | <u>M</u><br><u>VP</u> | 1x1x1                                  | magnetic property, catalytic reaction,<br>new materials,                                                             | +                                    |
| Bi <sub>2</sub> ReO <sub>5</sub> , Bi <sub>2</sub> ReO <sub>6</sub> , Bi <sub>2</sub> WO <sub>5</sub> , Bi <sub>2</sub> WO <sub>6</sub> ,<br>Bi <sub>2</sub> MoO <sub>5</sub> , Bi <sub>2</sub> MoO <sub>6</sub> , Bi <sub>2</sub> LnO <sub>6</sub> (Ln :<br>Rare earth elements )<br>Ln <sub>2</sub> ReO <sub>6</sub> , Ln <sub>2</sub> MoO <sub>6</sub> , Ln <sub>2</sub> WO <sub>6</sub> | <u>Sub</u>            | 2x1x1                                  | catalytic reaction, new materials,<br>ferroelectric materials                                                        | +                                    |

| <b>373</b><br>Name(s): S. Kimura<br>Inst. & Address: National Institute For Researches in Inorganic Materials<br>1-1, Namiki, Sakura-mura, Niihari-gun, Ibaraki-ken, Japan 300-31 Telephone: 0298-51-3351 |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Y <sub>3</sub> Fe <sub>5</sub> O <sub>12</sub> (YIG)                                                                                                                                                      | Z       | 8φ x 50                                | J. Crystal Growth <u>41</u> (1977) 192                                                                               | -                                    |
| " ( " )                                                                                                                                                                                                   | Z       | 8φ x 5                                 |                                                                                                                      | +                                    |
| YFe <sub>2</sub> O <sub>4</sub>                                                                                                                                                                           | Z       | 3x1.5x0.5                              | Mat. Res. Bull. <u>11</u> (1976) 637                                                                                 | +                                    |
| YFeO <sub>3</sub> (Yttrium Orthferrite)                                                                                                                                                                   | Z       | 8φ x 50                                |                                                                                                                      | +                                    |
| Fe <sub>3</sub> O <sub>4</sub> (Magnetite)                                                                                                                                                                | Z       | 8φ x 20                                | Cation Purity: 99.9%, [110]                                                                                          | +                                    |
| BaFe <sub>12</sub> O <sub>19</sub> (Ferroxdure, M)                                                                                                                                                        | Z       | 6φ x 20                                |                                                                                                                      | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Lanthanum Hexaboride ( $\text{LaB}_6$ )                               | <u>Z</u> | 10 mm $\phi$ x<br>50 mm                | <p>Thermionic work functions and Richardson constants for <math>\text{LaB}_6</math> single crystals are measured. They are 2.86 eV for the (100) plane, 2.68 eV for the (110) plane and 3.4 eV for (111) plane. The (111) faceting on the (110) plane has an important effect on the reduction of thermionic current at <math>5 \times 10^{-6}</math> Torr. C. Oshima et al. J Appl. Phys. 48(1977) 3925</p> <p>Carbon atoms segregated on the <math>\text{LaB}_6</math> (001) surface at elevated temperatures formed an epitaxial graphite layer and carbide-like layer. The properties of the layers has been discussed. C. Oshima et al. Japan. J. Appl. Phys. 16(1977)965.</p> <p>The values of work function of borides are much correlated with its electron density as similar to the case of metallic element and is explained in view of the theory proposed by Lang and Kohn. The change of surfaces due to ion sputtering and oxygen chemisorption are also discussed. Three dimensional frame work of boron at <math>\text{LaB}_6</math> surfaces is important for stability of the surface. C. Oshima et al. Ohyo Buturi (Appl. Phys.) 45 (1976)600. (in Japanese). Shinkuh (Vacuum) 20(1977)46. ( in Japanese).</p> |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdTe                                                                  | Br      | 10 x 70                                | 5N, dopants (undoped, In, Cl, P)                                                                                     |                                      |
|                                                                       | THM     |                                        |                                                                                                                      |                                      |
| ZnTe                                                                  | Br      | 10 x 70                                | 5N, undoped                                                                                                          |                                      |
|                                                                       | GE      |                                        | Heterojunction (on CdTe)                                                                                             |                                      |
| $\text{GeS}_2$                                                        | Sub     | 2x5x0.05                               | 5N, undoped                                                                                                          |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{REB}_6$ , Rare Earth (La, Ce, Nd, Sm, Eu, Gd) Hexaborides.     | Z       | 9mm diam.<br>x60mm l.                  | Purities about 5N. Electron emission, electrical and magnetic properties studies.                                    | -                                    |
| $\text{RB}_2$ , Transition metal (Cr, Ti, Zr) Diborides.              | Z       | 9mm diam.<br>x50mm l.                  | Purities about 4N. Electronic properties.                                                                            | -                                    |
| Transition metal carbides.                                            | Z       | 8mm diam.<br>x100mm l.                 | Purities about 3N. Electronic and Mechanical properties.                                                             | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NbCl <sub>4</sub>                                                     | VP      | 3x0.2x0.2                              | Electrical property under high pressure                                                                              |                                      |
| NbI <sub>4</sub>                                                      | VP      | 3x0.2x0.2                              |                                                                                                                      |                                      |
| Nb <sub>3</sub> I <sub>8</sub>                                        | VP      | 3x3x0.1                                |                                                                                                                      |                                      |
| Nb <sub>3</sub> Ge                                                    | CVD     |                                        | Superconducting property                                                                                             |                                      |
| Nb <sub>3</sub> Si                                                    | CVD     |                                        |                                                                                                                      |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CrSi <sub>2</sub>                                                     | Z       | 8x 35                                  | At room temp.<br>hole concentration: $6.25 \times 10^{20} \text{ cm}^{-3}$<br>hole mobility: $15 \text{ cm}^2/\text{V s}$ (a-axis)<br>$6.7 \text{ cm}^2/\text{V s}$ (c-axis)<br>I. Nishida, J. Mater. Sci. <u>7</u> (1972) 1119.                                                                                                                       | +                                    |
| MnSi <sub>~1.73</sub>                                                 | Br      | 16x 70                                 | Growth rates: 0.33~6.0 mm/h<br>Chemical composition: MnSi <sub>1.713~1.715</sub><br>All crystals contain plate-like MnSi pre-<br>cipitates. All of the MnSi are parallel<br>to the c-plane in the matrix of Mn <sub>15</sub> Si <sub>26</sub> .<br>I. Kawasumi, I. Nishida, K. Masumot and<br>M. Sakata, Jap. J. Appl. Phys. <u>15</u> (1976)<br>1405. |                                      |
| Mn <sub>15</sub> Si <sub>26</sub>                                     | VP      | 1.5                                    | Transport agent: CuCl <sub>2</sub><br>T. Kojima and I. Nishida, Jap. J. Appl.<br>Phys. <u>14</u> (1975) 141.                                                                                                                                                                                                                                           |                                      |
| MnSi                                                                  | Br      | 18x 80                                 | Growth rate: 1.0~6.0 mm/h<br>Chemical composition: MnSi <sub>1.021~1.043</sub>                                                                                                                                                                                                                                                                         |                                      |

| <b>379</b><br>Name(s): Hisashi Sekine, Kazumasa Togano, Kyoji Tachikawa<br>Inst. & Address: National Research Institute for Metals, 2-3-12, Nakameguro<br>Meguro-ku, Tokyo, Japan Telephone: 03(719)2271<br>ext. 284 |                |                                        |                                                                                                                                                                                                                                                                                                                                                  |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
| V <sub>3</sub> (Ge,Al)                                                                                                                                                                                               | Dif-<br>fusion |                                        | Properties studied: Superconducting transition temperature, T <sub>c</sub> =7.0~12.5K, superconducting upper critical field, H <sub>c2</sub> =2.0~18.0T.<br>Characterization: Polycrystal<br>Publication: Transition temperature and upper critical field of superconducting V-Al/Cu-Ge composite tapes, Appl. Phys. Lett. <u>32</u> (1978) 582. | +                                    |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                        | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ag <sub>2</sub> S                                                                                                                                            | <u>M</u>  | 2×20×30                                | J. Phys. C: Solid State Physics., <u>11</u> (1978) 651.                                                              | -                                    |
| Ultrafine particles of metals: Al, Zn, Ge, Cd, Pb, Cu, Ag, Au, Mn, Fe, Co, Ni, and Pd                                                                        | <u>VP</u> | 100×10 <sup>-8</sup>                   | J. Phys. Soc. Japan, <u>39</u> (1975) 1586.<br>J. Phys. Soc. Japan, <u>44</u> (1978) 1547.                           | -                                    |

| <b>381</b><br>Name(s): Taketoshi Hibiya, Hiroshi Makino, Kozaburo Suzuki<br>Inst. & Address: Central Research Laboratories, Nippon Electric Co., Ltd.,<br>Kawasaki, Japan Telephone: 044-855-1111<br>Ext. 2169                                                                                                                                                                                                                                                                                                                   |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                                                                                                                                                                            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| (Y,Sm,Tm,Ca) <sub>3</sub> (Fe,Ge) <sub>5</sub> O <sub>12</sub><br>(Y,Sm,Lu,Ca) <sub>3</sub> (Fe,Ge) <sub>5</sub> O <sub>12</sub><br>(Y,Eu,Tm,Ca) <sub>3</sub> (Fe,Ge) <sub>5</sub> O <sub>12</sub><br>(Y,Eu,Lu,Ca) <sub>3</sub> (Fe,Ge) <sub>5</sub> O <sub>12</sub><br>(Y,Sm,Tm) <sub>3</sub> (Fe,Ga) <sub>5</sub> O <sub>12</sub><br>(Y,Sm,Lu) <sub>3</sub> (Fe,Ga) <sub>5</sub> O <sub>12</sub><br>(Y,Eu,Tm) <sub>3</sub> (Fe,Ga) <sub>5</sub> O <sub>12</sub><br>(Y,Eu,Lu) <sub>3</sub> (Fe,Ga) <sub>5</sub> O <sub>12</sub> | LE      | 50.0                                   | Grown on [111] oriented Gd <sub>3</sub> Ga <sub>5</sub> O <sub>12</sub> for use in magnetic bubble memory devices    |                                      |

| <b>382</b><br>Name(s): Fumio SHIMURA<br>Inst. & Address: Central Res. Labs., Nippon Electric Company, Ltd.,<br>Miyazaki, Takatsu, Kawasaki, Japan<br>Telephone: 044-855-1111<br>Ext. 2095 |         |                                        |                                                                                                                            |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.       | Material<br>Avail-<br>ability<br>+ - |
| $\text{Ni}_5\text{TiO}_7$ ; Nickel titanium oxide                                                                                                                                         | Flu     | 10,0.5,0.5                             | F. Shimura and T. Kawamura, Japan. J. Appl. Phys. <u>15</u> (1976), 1403                                                   |                                      |
| $\text{LiNb}_{1-y}\text{Ta}_y\text{O}_3$ ; INT                                                                                                                                            | Cz      | 40, 10 <sup>6</sup>                    | F. Shimura and Y. Fujino, J. Crystal Growth, <u>38</u> (1977), 293<br>F. Shimura, J. Crystal Growth, <u>42</u> (1977), 579 |                                      |

| <b>383</b><br>Name(s): Tsutomu MINAMI<br>Inst. & Address: University of Osaka Prefecture, Department of Applied Chemistry Telephone: 0722-52-1161<br>Sakai-Shi, Osaka-Fu 591, JAPAN<br>ex.2304 |         |                                        |                                                                                                                                                                                                                                                                                                                                                               |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
| Vitreous semiconductors<br>(chalcogenide glass system)                                                                                                                                         |         |                                        | Electrical, optical, thermal, thermoelec-<br>trical, photoelectrical, and photovoltaic<br>properties.<br><br>J. Amer. Ceram. Soc. <u>59</u> , 461 (1976).<br>J. Non-Crystalline Solids, <u>23</u> , 431 (1977).<br>Japan. J. Appl. Phys. <u>16</u> , 977 (1977).<br>Phys. Chem. Glasses, <u>18</u> , 112 (1977).<br>Thin Solid Films, to be published (1978). | -                                    |
| Superionic conducting glasses<br>(silver halide containing<br>glass system)                                                                                                                    |         |                                        | Electrical, optical, thermal, thermoelc-<br>trical properties.<br><br>J. Amer. Ceram. Soc. <u>60</u> , 283 (1977)<br>J. Amer. Ceram. Soc. <u>60</u> , 467 (1977)<br>J. Electrochem. Soc. <u>124</u> , 1659 (1977).<br>J. Non-Crystalline Solids, in press (1978).                                                                                             | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                                                                                                                  | METHOD*              | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <p>n-type Silicon single crystal</p> <p>1) Chemical etching for mirror surface<br/>Anodic oxidation to form SiO<sub>2</sub></p> <p>2) Inert gas ion hot implantation through SiO<sub>2</sub></p> <p>3) Removal of SiO<sub>2</sub> for the electrical measurement</p> <p>Redistribution of dopants in Si by the vacancy flow made by the inert gas ion implantation (the dopants were uniformly distributed before ion bombardment)</p> | <u>Z</u> , <u>Cz</u> | 7x7x0.3                                | <p>4x10<sup>13</sup> - 1x10<sup>16</sup> cm<sup>-3</sup> (P doped) [111]<br/>1x10<sup>15</sup> (Sb doped) [100]</p> <p>Carrier concentration profile measurement both by the C-V and the Copeland method</p> <p>The carrier decreased region was observed below the initial dopant level</p> <p>The strong electric field was generated near the surface to extract the excess electrons toward the implanted side</p> <p>(Applications)</p> <p>Novel impurity concentration (e.g. n<sup>+</sup>-n<sup>-</sup>-n, n<sup>+</sup>-p<sup>-</sup>-n<sup>-</sup>; the latter may be obtained in the case where the compensated (n<sup>-</sup>) substrates were used.)</p> <p>Gettering in the video camera</p> <p>Japan. J. appl. Phys. <u>12</u> (1973) 472<br/>Japan. J. appl. Phys. <u>16</u> (1977) 1281</p> | +                                    |

385

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)        | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------------|------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Al <sub>x</sub> Ga <sub>1-x</sub> P and Al <sub>x</sub> Ga <sub>1-x</sub> Sb | <u>Sol</u> | 4X3X0.5                                | <p>Dopants; Si and Zn.</p> <p>Properties studied; Energy gap, Emission spectrum, Excitation spectrum, Photovoltaic effect and Resistivity.</p> <p>Applications; LED for green light, and modulator and laser for optical communication.</p> <p>Publications; APL <u>22</u> 532 (1973), APL <u>24</u> 77 (1974), JAP <u>45</u> 5109 (1974) and JAP <u>46</u> 3693 (1975).</p> | +                                    |

386

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)     | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl-KBr<br><br>Potassium chloride-<br>potassium bromide<br>solid solution | Cz      | 50 dia<br>x 50                         | The mechanical properties have been<br>studied at low temperatures. This material<br>shows a solid solution softening near the<br>liquid helium temperature.<br><br>Ref.<br>T.Kataoka, T.Uematsu and T.Yamada:<br>Japan. J. appl. Phys. <u>17</u> (1978) 271. | +                                    |

387

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*   | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZnTe<br>(Zinc telluride)                                              | <u>M</u>  | 10 $\phi$ x 50                         | undoped<br>dopant : As, ( $10^{17} \sim 10^{18} \text{cm}^{-3}$ )<br>P ( $4 \times 10^{16} \sim 10^{18} \text{cm}^{-3}$ )<br>Li, ( $4 \times 10^{16} \sim 5 \times 10^{17} \text{cm}^{-3}$ ) | -                                    |
| PbO<br>(yellow lead oxide)                                            | <u>M</u>  | 10 x 5 x 2                             | dopant : Bi                                                                                                                                                                                  | +                                    |
| HgSe                                                                  | <u>Br</u> | 9x9x20mm <sup>3</sup>                  | Far-infrared reflectivity                                                                                                                                                                    | -                                    |
| Cd <sub>x</sub> Hg <sub>1-x</sub> Se                                  | <u>Br</u> | 9x9x20mm <sup>3</sup>                  | 0 < x < 0.3, Far-infrared reflectivity                                                                                                                                                       | -                                    |
| Zn <sub>x</sub> Hg <sub>1-x</sub> Se                                  | <u>Br</u> | 9x9x20mm <sup>3</sup>                  | 0 < x < 0.2, Far-infrared reflectivity                                                                                                                                                       | -                                    |
| RbAg <sub>4</sub> I <sub>5</sub>                                      | <u>Br</u> | 5x5x10mm <sup>3</sup>                  | Raman scattering, Brillouin scattering and<br>infrared measurements                                                                                                                          | -                                    |
| RbCoBr <sub>3</sub> ,<br>RbMnBr <sub>3</sub>                          | <u>Br</u> | 3x3x10mm <sup>3</sup>                  | Raman scattering,<br>dopant : Co, Ni.                                                                                                                                                        | -                                    |
| GaSe,<br>GaTe                                                         | <u>Br</u> | 5x5x10mm <sup>3</sup>                  | Raman scattering<br>non-linear optics                                                                                                                                                        | -                                    |

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|-----------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                       | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                         | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                   | Material<br>Avail-<br>ability<br>+ - |
| GaAs<br>(Gallium Arsenide)                                                                                                  | <u>VLS</u> | triangular<br>needle<br>L.10-W.0.4<br>(mm)                     | orientation - [111]<br>nearly perfect crystal<br>dopant - Au<br>resistivity - 0.004 $\Omega$ cm<br>application - as samples of field emitters<br>of FIM, FEM and APFIM | +                                    |
| GaP<br>(Gallium Phosphide)                                                                                                  |            | triangular<br>and hexag-<br>onal needles<br>L.16-W.0.5<br>(mm) | publication, Surf. Sci. 69 (1977) 521                                                                                                                                  |                                      |

| <b>389</b><br>Name(s): Takanori Tomita, Dr<br>Inst. & Address: Department of Physics, Faculty of Science, Saitama University, Urawa, 338 JAPAN Telephone: 0488-52-2111                                                                                                                      |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
| CaF <sub>2</sub> single crystals<br>Si very pure single<br>crystals<br>SiC various polytypes<br>pure single crystals<br>All the crystals were offered<br>by the producers and only<br>studied by the X-Ray topography,<br>X-Ray energy analyser and EPR<br>sometimes at Liq. He temperature |         |                                        | Sr, Ba other impurity Ti 0.05% or less<br>Neutron or Co- irradiation effect<br>very few dislocations<br>Energy spectrum of diffracted X-rays at special<br>angles of incidence<br>should be asked to Norton Co., Canada<br>General Electric Co., U.S.A.<br>Semi-Elements Inco., U.S.A.<br>A. F. C. R. L., U.S.A.<br>Topographic study of Dislocations<br>Determination of polarity by anomalous dispersion<br>of X-rays<br>Publications;<br>X-Ray Study of -SiC<br>Proceedings VI Int. Conf. X-Ray Optics<br>& Microanalysis (1972) 685<br>Inclusions Found in Solution-Grown -SiC<br>Proceedings III Int. Conf. SiC (1973) 141<br>A Concept for The Growth of Twinned Crystals<br>of fcc Structure<br>J. Crystal Growth 24/25 (1974) 331<br>Rotational Twin of The Hollow Crystal Found<br>for Solution-Grown -SiC<br>Acta Cryst. S (1975) (abstract) | -<br>-<br>-                          |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                          | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ -                                                   |
|--------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| $\text{Ca}_2\text{Sr}(\text{C}_2\text{H}_5\text{COO})_6$ : Dicalcium Strontium<br>Propionate(DEP)                              | Sol     | 20x20x20                               | Bipyramidal                                                                                                          | Ferroelectricity(Domain,<br>Hysteresis, Dielectric<br>properties) has been<br>studied. |
| $(\text{CH}_3\text{H}_6)\text{Al}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ : Guanidine Almi-<br>num Sulfate Hexahydrate(GASH) | Sol     | 55x55x25                               | Hexagonal Prism                                                                                                      |                                                                                        |
| $\text{NH}_2\text{CH}_2\text{COOH}$ $\text{AgNO}_3$ : Glycine Silver<br>Nitrate(GSN)                                           | Sol     | 5x5x20                                 | Plastic                                                                                                              |                                                                                        |
| $\text{LiH}_3(\text{SeO}_3)_2$ : Lithium Trihydrogen<br>Selenite(LMS)                                                          | Sol     | 40x25x25                               | Yellowish                                                                                                            |                                                                                        |
| $\text{SC}(\text{NH}_2)_2$ : Thiourea                                                                                          | Sol     | 15x10x10                               | Sixsided Prism                                                                                                       |                                                                                        |
| $(\text{NH}_2\text{CH}_2\text{COOH})_3 \cdot \text{H}_2\text{SO}_4$ : Triglycine<br>Sulfate(TGS)                               | Sol     | 15x15x20                               | Transparent                                                                                                          |                                                                                        |
| $(\text{NH}_2\text{CH}_2\text{COOH})_3 \cdot \text{H}_2\text{SeO}_4$ : Triglycine<br>Selenate(TGSe)                            | Sol     | 30x30x10                               | "                                                                                                                    |                                                                                        |
| $(\text{NH}_2\text{CH}_2\text{COOH})_3 \cdot \text{H}_2\text{BeF}_4$ : Triglycine<br>Fluoberyllate<br>(TGFB)                   | Sol     | 10x10x10                               | "                                                                                                                    |                                                                                        |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                           | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-----------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Bi Single Crystal                                                     | $\underline{Z} + \underline{C}_Z$ | $4\phi \times 15$                      | Residual Resistivity $R_{300K} / R_{4.2K} \div 750$                                                                  |                                      |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\text{LiIO}_3$                                                       | sol     | 10x10x50                               | dielectric and optical properties                                                                                    |                                      |
| $\text{NH}_4\text{IO}_3$                                              | sol     | 2 x2 x8                                | crystal growth, dielectric properties.                                                                               |                                      |
| $\text{CsIO}_3$ , $\text{RbIO}_3$                                     | sol     | 1 x1 x1                                | crystal growth.                                                                                                      |                                      |
| $\text{SC}(\text{NH}_2)_2$                                            | sol     | 5 x10x10<br>2 x30x30                   | dielectric properties, phase transitions,<br>crystal growth mechanism.                                               |                                      |
| Rochelle salt                                                         | sol     | 30x30x50                               | optical properties,<br>crystal and ferroelectric domain growth<br>mechanism.                                         |                                      |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                     | METHOD*    | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| SnO <sub>2</sub>                                                                                                                                                                          | VP<br>(CT) | 2x2x2                                  | J. of Crystal Growth, 40(1977)291                                                                                    | -                                    |

| <b>394</b><br>Name(s): Shoji Yamada and Michihiko Kitao<br>Inst. & Address: Research Institute of Electronics, Shizuoka University,<br>Hamamatsu 432, JAPAN Telephone: |         |                                        |                                                                                                                                                                                                 |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                  | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                            | Material<br>Avail-<br>ability<br>+ - |
| As <sub>2</sub> Se <sub>3</sub><br>(Arsenic Triselenide)                                                                                                               | Sub     | 15x8x1.5<br>mm <sup>3</sup>            | * P <sub>2</sub> /n (layered structure).<br>* Optical gap is about 1.77eV.<br>* $\sigma \approx 3 \times 10^{-14} \Omega^{-1} \text{cm}^{-1}$ .<br>* Japan. J. Appl. Phys. <u>8</u> (1969) 499. | -                                    |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Bi <sub>12</sub> GeO <sub>20</sub>                                                                                                                                                         | M,LE    | 40x40x800                              | Optical grade                                                                                                        | +                                    |
| LiNbO <sub>3</sub>                                                                                                                                                                         | M       | 15x15x300                              | Optical grade                                                                                                        | +                                    |
| LiTaO <sub>3</sub>                                                                                                                                                                         | M       | 15x15x300                              | Optical grade                                                                                                        | +                                    |
| Bi <sub>12</sub> SiO <sub>20</sub>                                                                                                                                                         | M       | 20x20x400                              | Optical grade                                                                                                        | -                                    |
| GaAs                                                                                                                                                                                       | GE      | 20x30x0.01                             | FET, mixer diode on Cr doped substrates                                                                              | -                                    |
| GaAs-GaAlAs                                                                                                                                                                                | LE      | 10x10x0.01                             | Laser diode                                                                                                          | -                                    |

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|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GaAs poly crystal                                                     | Br      | 400x50x50                              | Purity: 6N up                                                                                                        | +                                    |
| GaAs single crystal                                                   | Br      | 350x50x25                              | Dopants: none, Si, Te, Sn, Zn, Cr-O                                                                                  | +                                    |
| GaAs epitaxial wafer                                                  | GE      | (~10 cm <sup>2</sup> )                 | Applications: FET etc                                                                                                | +                                    |
| GaP poly crystal                                                      | M       | 75 <sup>φ</sup> x 50                   | Purity: 6N                                                                                                           | +                                    |
| GaP single crystal                                                    | Cz      | 45 <sup>φ</sup> x 150                  | (111)/(100), Dopants: none, S                                                                                        | +                                    |
| GaP epitaxial wafer                                                   | LE      | (~15 cm <sup>2</sup> )                 | Applications: LED (Green, Red etc)                                                                                   | +                                    |
| InP poly crystal                                                      | M       | 75 <sup>φ</sup> x 50                   | Purity: 6N in use of source                                                                                          | +                                    |
| InP single crystal                                                    | Cz      | 45 <sup>φ</sup> x 100                  | Dopants: S, (Fe)                                                                                                     | +, (-)                               |
| InSb poly crystal                                                     | Z       | 1000x60x30                             | Purity: 6N                                                                                                           | +                                    |
| InSb single crystal                                                   | Cz      | 50 x 300                               | Applications: Detector, Hall-element etc                                                                             | +                                    |
| InAs poly crystal                                                     | Br      | 350x50x25                              | Purity: 6N in use of source                                                                                          | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KCl                                                                   | Cz      | 10x10x40                               | Purity: 99.99% (Merk.Co.)<br><br>Orientation: [100]<br><br>Dislocation density: $6 \times 10^4/\text{cm}^2$<br><br>Publications: Kristall und Technik,<br>Heft 9 (September)/1978,<br>(to be published). | +                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*                 | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|-------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CdS (Cadmium Sulfide)                                                 | <u>Sub</u><br><u>Br</u> | 10x10x0.05<br>15φ x40                  | Dopants: group I, III, V and VII elements<br>Properties studied: electrical and optical prop-<br>erties<br>Applications: light emitting diodes and solar cells<br>Publications: Japan.J.appl.Phys. 14(1975) 1403<br>Japan.J.appl.Phys. 14(1975) 1733<br>Japan.J.appl.Phys. 15(1976) 2365<br>Japan.J.appl.Phys. 15(1976) 2463 | No                                   |
| CdSe (Cadmium Selenide)                                               | <u>Sub</u><br><u>Br</u> | 16φ x40<br>15φ x40                     | Dopants: group I, III, V and VII elements<br>Properties studied: electrical and optical prop-<br>erties<br>Applications: photoconductive cells and solar cells<br>Publications: Japan.J.appl.Phys. 13(1974) 1393<br>Japan.J.appl.Phys. 14(1975) 1059<br>Japan.J.appl.Phys. 15(1975) 1387<br>Japan.J.appl.Phys. 17(1978) 1127 | No                                   |

399

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)     | METHOD*                | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                            | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------|------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZnS (Zinc Sulfide)                                                        | <u>Br</u>              | 15φ x40                                | Dopants: Al<br>Properties studied: electrical and optical prop-<br>erties<br>Applications: light emitting diodes                                                                                | No                                   |
| ZnSe (Zinc Selenide)                                                      | <u>Br</u><br><u>GE</u> | 15φ x40<br>10x10x0.05                  | Dopants: group I, III, V and VII elements<br>Properties studied: electrical and optical prop-<br>erties<br>Applications: light emitting diodes<br>Publications: Japan.J.appl.Phys. 13(1974) 357 | No                                   |
| Zn <sub>x</sub> Cd <sub>1-x</sub> S (x = 0~0.7)<br>(Zinc Cadmium Sulfide) | <u>GE</u>              | 10x10x0.05                             | Dopants: group VII elements<br>Properties studied: electrical and optical prop-<br>erties<br>Publications: Japan.J.appl.Phys. 16(1977) 1455<br>Japan.J.appl.Phys. 16(1977) 2115                 | No                                   |
| CuInSe <sub>2</sub> (Copper Indium Selenide)                              | <u>Br</u>              | 3x3x3                                  | Properties studied: electrical properties<br>Applications: solar cells<br>Publications: Japan.J.appl.Phys. 16(1977) 879                                                                         | No                                   |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.      | Material<br>Avail-<br>ability<br>+ - |
| $\text{LiNH}_4\text{C}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$ (LAT)                                                                                                      | Sol     | 10x30x60                               | For $\text{Cr}^{3+}$ dope material. ESR measurement for pure material. Elastic properties ferroelectric and ferroelastic. |                                      |
| $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O} - \text{NaNH}_4\text{C}_4\text{H}_4\text{O}_6$<br>4H <sub>2</sub> O mixed crystal                                    | Sol     | 10x20x30                               | Elastic properties (elastic compliance).                                                                                  |                                      |
| $\text{K}_5\text{Nd}(\text{MoO}_4)_4$                                                                                                                                             | Cz      | 15x 8x65                               | Dielectric constant, refractive indices, birefringence. Stoichiometric laser material.                                    |                                      |

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|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                           | METHOD*     | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| PAA                                                                                                                                             | <u>Sub</u>  |                                        | P-V-T relations, transport.                                                                                          |                                      |
| PBB                                                                                                                                             | <u>Sub</u>  |                                        | " "                                                                                                                  |                                      |
| Cristobalite                                                                                                                                    | <u>Flux</u> |                                        | Phase transition                                                                                                     |                                      |
|                                                                                                                                                 | <u>Hyd</u>  |                                        |                                                                                                                      |                                      |
| MgO                                                                                                                                             | <u>Hyd</u>  |                                        | Topochemical properties.                                                                                             |                                      |

| <b>402</b><br>Name(s): Masaharu AOKI<br>Inst. & Address: Dept. Electronic Eng., Fac. Eng., Univ. of Tokyo, Bunkyo-ku Tokyo, 113, JAPAN Telephone: 03-812-2111 ext. 3126 |         |                                        |                                                                                                                      |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                   | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| ZnS                                                                                                                                                                     | Sol     | 2 x 2 x 1 <sup>mm</sup>                | Crystals are grown from Tellurium as a solvent                                                                       | -                                    |

| <b>403</b><br>Name(s): Koichi Kitazawa & Kazuo Fueki<br>Inst. & Address: Dept. Industrial Chem., Univ. of Tokyo, Tokyo, 113, Japan Telephone: |         |                                        |                                                                                                                                                                                        |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                         | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                   | Material<br>Avail-<br>ability<br>+ - |
| $\text{Y}_2\text{O}_3$ yttria                                                                                                                 | Z       | 3.5φ<br>x 100                          | 4N; 100, 111; $\text{Nd}_2\text{O}_3$ ; electrical<br>conductivity, laser efficiency ;<br>dislocation density $2 \times 10^4/\text{cm}^2$ ;<br>J. Crystal Growth, <u>39</u> 211 (1977) | -                                    |

404

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| anthracene                                                            | Br      | 20 x 20 x 20                           | semiconducting grade; any orientation;<br>photoconducting properties;<br>J. Phys. Soc. Japan 17(1962)113, 24(1968)792. | +                                    |
| anthraquinone                                                         | Br      | 10 x 10 x 10                           | semiconducting grade; any orientation;<br>photoconducting properties;<br>J. Phys. Soc. Japan 24(1968)798.              | +                                    |
| FeCr <sub>2</sub> S <sub>4</sub>                                      | VP      | 2 x 2 x 2                              | purity not yet identified; octahedron;<br>ferrimagnetic semiconductor;<br>to be published in Japan. J. appl. Phys.     | +                                    |
| CdCr <sub>2</sub> Se <sub>4</sub>                                     | VP      | 1.5x1.5x1.5                            | purity not yet identified; octahedron;<br>ferromagnetic semiconductor;                                                 | +                                    |
| Cr <sub>2</sub> S <sub>3</sub>                                        | VP      | 3.0x3.0x0.2                            | purity not yet identified; platelet;<br>J. Crystal Growth 43(1978)711.                                                 | +                                    |
| (SN) <sub>x</sub>                                                     | VP      | 3 x 3 x 3                              | purity not yet identified.                                                                                             | +                                    |

405

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                 | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Silicon                                                               | Cz      |                                        | The swirl formation of microdefects in<br>dislocation-free Cz crystals was observed<br>by means of X-ray diffraction topography<br>cooperated with heat treatment.<br>J. Cryst. Growth 39, 227(1977) | -                                    |
|                                                                       | Z<br>Cz |                                        | The structures and the dimensions of micro-<br>defects in dislocation-free crystals were<br>studied by means of diffuse X-ray scatter-<br>ing.<br>Appl. Phys. Lett. 32, 271(1978)                    | -<br>-                               |

406

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                    | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|----------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| LiTaO <sub>3</sub> , Lithium Tantalate                                | C <sub>z</sub> | 65φ x 120                              | "SAW grade" quality. Purity: 4N except Rh, Rh < 150 ppm. X-axis grown boules. Surface acoustic wave (SAW) properties, piezoelectric properties and crystal homogeneity were studied for SAW, piezoelectric and pyroelectric devices applications.<br>Proc. Ferro. Material appl. 1 (1977) 81<br>Proc. Ferro. Material appl. 1 (1977) 87 | +                                    |
| LiNbO <sub>3</sub> , Lithium Niobate                                  | C <sub>z</sub> | 50φ x 100                              | Optical quality. Purity: 5N. X, Y and Z axis grown boules. Piezoelectric, ferroelectric and mechanical properties were studied for high temperature acoustic sensor, AE sensor and piezoelectric devices applications.                                                                                                                  | +                                    |
|                                                                       | EFG            | 20x100x1.5                             | Purity: 5N pure and Cr-doped. Plate crystal, plate normal and pulling direction; (100)<001>, (001)<210>. Piezoelectric properties and impurity distribution were studied. X-ray and optical characterization were carried out.<br>Mat. Res. Bull. 10 (1975) 801<br>J. Cryst. Growth 34 (1976) 350                                       | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)          | METHOD*        | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                          | Material<br>Avail-<br>ability<br>+ - |
|--------------------------------------------------------------------------------|----------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| LiTa <sub>x</sub> Nb <sub>1-x</sub> O <sub>3</sub> , Lithium Tantalate-Niobate | LE             | 15x30x0.005                            | LiNbO <sub>3</sub> film on LiTaO <sub>3</sub> substrate. Plate normal; (100) and (001). The film is grown by CLE technique using LiVO <sub>3</sub> flux. Evaluation of the film is carried out by X-ray and optical waveguiding measurements for optical waveguiding and SAW applications.<br>Appl. Phys. Lett. 28 (1976) 575 | -                                    |
|                                                                                | C <sub>z</sub> | 20φ x 50                               | Purity: 5N. X, Y and Z axis grown boules; X = 0.025, 0.05, 0.1, 0.2, 0.7 and 0.95. SAW and crystallographic properties were studied. Compositional homogeneity is examined by X-ray and chemical analysis.                                                                                                                    | -                                    |
|                                                                                | EFG            | 20x40x1.5                              | Purity: 5N. Plate crystal, plate normal and pulling direction; (100)<001>: X = 0.05, 0.2. Compositional homogeneity are studied.<br>J. Cryst. Growth 35 (1976) 127                                                                                                                                                            | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| KNbO <sub>3</sub> , Potassium Niobate                                 | M, Sol. | 40 x 40 x 20                           | Optical quality. Purity: 5N. "[001]" axis crystal grown by Kyropoulos technique. Dielectric, optical and Nonlinear optical properties were studied. X-ray and optical characterizations were carried out for nonlinear optical applications.<br>Japan J. appl. Phys. 10 (1971) 507<br>12 (1973) 841<br>13 (1974) 1021<br>13 (1974) 1362<br>J. Cryst. Growth 24/25 (1974) 450<br>Solid State Commu. 17 (1975) 427<br>Izv AN SSR, ser fiz. 41 (1977) 548 |                                      |

409

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Au <sub>4</sub> Mn                                                    | Br      | 12φ x 1                                | Au: 99.99%, Mn: 99.9%<br>Magnetostriiction                                                                           |                                      |

410

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                  | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| W single crystals<br>Mo single crystals                               |         | 1 x 3 x 20                             | RRR ~ 2000 ~ 20000, <111> <110> <100><br>internal friction, elastic after effect,<br>lattice constant and electrical resistivity<br>after fast neutron irradi. at 5K. | -                                    |

411

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZnS                                                                   |         |                                        | Color centers, radiation damage, F <sup>+</sup> -center,<br>optical absorption, luminescence                         |                                      |
| ZnTe                                                                  | M (THM) | 5 x 5 x 5                              | p-Type, 120 cm <sup>2</sup> /V·sec (RT)<br>1500 cm <sup>2</sup> /V·sec (77K)<br>Point defects                        |                                      |
| CdTe                                                                  | M (THM) | 5 x 5 x 40                             | p-Type 90 cm <sup>2</sup> /V·sec (RT), Point defect<br>Opto-electronics                                              |                                      |

412

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 ( 264 )

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                             | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| InAs<br>GaAs<br>InGaAs                                                | MBE     | 10x10x<br>~10 <sup>-4</sup>            | purity ; $ N_D - N_A  \sim 10^{16} \text{ cm}^{-3}$<br>orientation ; on ( 100 ) and ( 111 )<br>substrate<br><br>dopant ; non, Mg, Mn.                                                                                                                                                                                            |                                      |
| GaSb<br>GaSbAs                                                        | MBE     | 10x10x<br>~10 <sup>-4</sup>            | properties studied ; by RHEED, X-ray,<br>SEM and electrical<br>measurement<br><br>purity ; $ N_A - N_D  \sim 10^{16} \text{ cm}^{-3}$<br>orientation ; on ( 100 ) and ( 111 )<br>substrate<br><br>dopant ; non, Te.<br><br>properties studied ; by RHEED, X-ray,<br>SEM, electrical<br>and optical<br>absorption<br>measurements |                                      |

413

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Tellurium                                                             | VP      | 100-2000<br>Å thick<br>films           | Evaporated polycrystalline films, fabri-<br>cation techniques and electronic proper-<br>ties.<br>1. "Effect of Au nucleation centers and<br>deposition rate on crystallinity and<br>electronic properties of evaporated Te<br>films", J.Appl.Phys. 46(1975)105.<br>2. "Grain growth of evaporated Te films<br>on a heated and cooled substrate",<br>J.Appl.Phys. 46(1975)1473.<br>3. "Low-temperature grain growth of evapo-<br>rated Te films", Japan.J.Appl.Phys. 15<br>(1976)1807.<br>4. "Effect of predeposited Ag,Sn,Al,Bi and<br>Se nucleation centers on the grain<br>growth of evaporated Te films", Japan.<br>J.Appl.Phys. 15(1976)1881.<br>5. "Annealing effect in evaporated Te<br>films", Japan.J.Appl.Phys. 16(1977)1571.<br>6. "Tellurium films evaporated on oriented<br>Au islands", Japan.J.Appl.Phys. 16(1977)<br>1753.<br>7. "Behavior of metal contacts to evapo-<br>rated Tellurium films", Thin Solid Films<br>30(1975)119.<br>8. "Mobility studies of evaporated Tel-<br>lurium films", Thin Solid Films, 33<br>(1976)165. |                                      |

414

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| ZnS(Zinc Sulfide)                                                     | GE      | 10x10x0.02                             | Grown on (111), (100) Ge and (100) GaAs substrates<br>by Zn-S-H <sub>2</sub> CVD.method.<br>Japan. J. appl. Phys. <u>17</u> 227 (1978)                                                                                                                                      | -                                    |
| CdSnP <sub>2</sub> (Cadmium Tin Diphosphide)                          | Sol     | 10x5x1                                 | Prism-like crystals with [111] prism axis.<br>Luminescent and electrical properties.                                                                                                                                                                                        | -                                    |
| InGaP(Indium Gallium Phosphide)                                       | Sol     | 10(dia)x5                              | Hall mibility of Te-doped In <sub>1-x</sub> Ga <sub>x</sub> P at 300K.<br>Japan. J. appl. Phys. <u>13</u> 1481 (1974)<br>Luminescence of Zn diffused In <sub>1-x</sub> Ga <sub>x</sub> P in the direct<br>transition region.<br>Japan. J. appl. Phys. <u>15</u> 2265 (1976) | -                                    |
|                                                                       | LE      | 5x5x0.1                                | Grown on (111) GaP and (100) GaAs substrates.<br>Luminescent and electrical properties.                                                                                                                                                                                     |                                      |

414a

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                            | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Co <sub>2</sub> GeO <sub>4</sub><br>COBALT GERMANATE                  | Cz      | 15(d) , 10                             | Fe or Ni < 0.01 %, growth direction : parallel to<br>the c-axis, magnetic properties studied,<br>a = 8.3175 Å, J. Crystal Growth 39 (1977) 241. | -                                    |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                              | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| RbCl : Eu <sup>2+</sup>                                               | Br      | 10x10x10                               | Purity of starting material: reagent grade<br>Dopant: EuCl <sub>2</sub> 0.5 wt.%; in crystal ~ 130 ppm Eu <sup>2+</sup><br>Property studied: EPR spectrum of Eu <sup>2+</sup><br>Characterization: single crystal cubic<br>Publication: Electron paramagnetic resonance of<br>Eu <sup>2+</sup> in orthorhombic sites of RbCl single crystals,<br>by J. Rubio O., E. Muñoz P., and G. Aguilar S.,<br>J. Chem. Phys. 61(12), 15 Dec. 1974.                                                                          | -                                    |
| KBr: Eu <sup>2+</sup><br>NaBr: Eu <sup>2+</sup>                       | Cz<br>" | 10x10x10<br>"                          | Purity of starting material: reagent grade<br>Dopant: EuCl <sub>2</sub> 0.5 wt.%; in KBr crystal ~ 115 ppm<br>Eu <sup>2+</sup> , in NaBr ~ 100 ppm, by at. ab. spectropho-<br>tometry<br>Property studied: EPR spectra of Eu <sup>2+</sup><br>Characterization: cubic single crystals<br>Publication: Studies by electron paramagnetic<br>resonance of K- and Na-bromides doped with Eu <sup>2+</sup> ,<br>by G. Aguilar S., H. Murrieta S., J. Rubio O.,<br>and E. Muñoz P., J. Chem. Phys. 62(4), 15 Feb. 1975. | +<br>+                               |

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)  | METHOD*      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                           | Material<br>Avail-<br>ability<br>+ - |
|------------------------------------------------------------------------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NaI: Eu <sup>2+</sup><br>RbI: Eu <sup>2+</sup><br>KI: Eu <sup>2+</sup> | Cz<br>"<br>" | 10x10x10<br>"<br>"                     | Purity of starting material: reagent grade<br>Dopant: EuCl <sub>2</sub> 0.5, 0.2, 0.06, and 0.003 wt%<br>in the melts of all three hosts<br>Property studied: EPR spectra of Eu <sup>2+</sup><br>Characterization: cubic single crystals<br>Publication: Electron paramagnetic resonance of<br>Eu <sup>2+</sup> in the alkali iodides, by J. Rubio O., H.<br>Murrieta S., E. Muñoz P., J. Boldú O., and<br>G. Aguilar S., J. Chem. Phys. 63(10), 15 Nov. 1975. | -<br>-<br>-                          |



419

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                  | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Si - Silicon                                                          | Sol     | normal<br>wafers or<br>specially<br>prepared<br>samples | Electronic grade; 100, 110, 111; concentration,<br>oxide quality, trap populations, surface state<br>charge determination by electrochemical and<br>electronic methods; barrier height measurements | -                                    |
| SiO <sub>2</sub> - silicon dioxide                                    |         |                                                         |                                                                                                                                                                                                     | -                                    |
| CdF <sub>2</sub> - cadmium fluoride                                   |         |                                                         |                                                                                                                                                                                                     | -                                    |

420

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.     | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NaCl, sodium chloride                                                 | Br      | ~ 25 dia,<br>~ 100 long                | High-purity (OH <sup>-</sup> free, ~ 10 <sup>-6</sup> mole fraction Me <sup>2+</sup> )<br>or doped with Me <sup>2+</sup> |                                      |
| KCl, potassium chloride                                               | Br      | "                                      | Materials used in examination of defect-sensitive<br>optical, electrical, and mechanical properties                      |                                      |

421

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                   | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Pb <sub>5</sub> Ge <sub>3</sub> O <sub>11</sub> , lead germanium oxide      | Cz      | 15-20 dia,<br>20-30 long               | Ferroelectric and electrooptic material<br>Starting materials (PbO, GeO <sub>2</sub> , SiO <sub>2</sub> ) spectrographic<br>grade purity; the crystals contain ~ 0.01-0.001 wt%<br>Pt. |                                      |
| Pb <sub>3</sub> GeO <sub>5</sub> , lead germanium oxide                     | Cz      | "                                      | Growth direction: c-axis                                                                                                                                                               |                                      |
| Pb <sub>5</sub> Ge <sub>2</sub> SiO <sub>11</sub> , lead germanium silicate | Cz      | "                                      | Crystals used in x-ray structure, thermal expansion,<br>dielectric permittivity, and electric conductivity<br>measurements                                                             |                                      |

422

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Pb, Lead                                                              | Br      | ∅100, h 200<br>200x90x15               | 4N, random, basic research<br>4N, at request, flat neutron monochromators                                            | +                                    |
| Zn, Zinc                                                              |         | ∅100, h 200<br>200x90x14               | 4N, at request, basic research<br>4N, at request, flat and focusing neutron<br>monochromators                        |                                      |
| Al, Aluminium                                                         |         | ∅80, h 150<br>150x90x10                | 4N, random, basic research<br>4N, at request, flat and focusing neutron<br>monochromators                            |                                      |
| Cu, Copper                                                            |         | ∅110, h 200<br>180x90x10               | 4N, at request, basic research<br>4N, at request, flat and focusing neutron<br>monochromators                        |                                      |
| Sn, Tin                                                               |         | ∅70, h 100                             | 4N, random, basic research                                                                                           |                                      |
| Mg, Magnesium                                                         |         | ∅70, h 100                             | 4N, " , " "                                                                                                          |                                      |
| Ag, Silver                                                            |         | ∅50, h 70                              | 4N, " , " "                                                                                                          |                                      |
| Bi, Bismuth                                                           |         | ∅150, h 200                            | 4N, " , " " , neutron filters                                                                                        |                                      |
| Ni, Nickel                                                            |         | ∅50, h 80                              | 3N, " , " "                                                                                                          |                                      |
| Co, Cobalt                                                            |         | ∅40, h 60                              | 2N7 " , " "                                                                                                          |                                      |
| α Brass                                                               |         | ∅30, h 60                              | 4N " , " "                                                                                                           |                                      |
| Ni-Fe Alloys                                                          |         | ∅50, h 80                              | Ni-3N, Fe armco, random, basic research                                                                              |                                      |
| Co-Fe 8 at. %                                                         |         | ∅60, h 80                              | Co-2N7, Fe armco, random; oriented plates<br>for neutron polarization                                                |                                      |
| Ni-Co Alloys                                                          |         | ∅50, h 70                              | Ni-3N, Co-2N7, random, basic research                                                                                |                                      |
| Other Alloys at request                                               |         |                                        |                                                                                                                      |                                      |

423

Name(s): Janusz BERDOWSKI

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ul. B. Krzywoustego 2, Poland

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm)                                              | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                        | Material<br>Avail-<br>ability<br>+ - |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| NH <sub>4</sub> (1-x)D <sub>4</sub> xH <sub>2</sub> (1-x)D <sub>2</sub> AsO <sub>4</sub><br>Deuterium Ammonium Dihydrogen<br>Arsenate /DADA/ | Sol     | paraelec-<br>tric phase<br>16x12x80<br>antiferro-<br>electric<br>phase<br>15x12x140 | The paraelectric DADA crystals contained<br>from 0 to 98% deuterium.<br>The antiferroelectric DADA crystals con-<br>tained 98% deuterium.<br>Studies an electric, electrooptic,<br>acoustooptic properties. | +                                    |

424

Name(s): Z. Bojarski, M. Surowiec, K. Wokulska, Z. Wokulski

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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| α- Fe whiskers                                                        | VP      | 0,5x0,5x40                             | 1/Acta Phys. Polonica A39/2 /1971/ 189                                                                               | +                                    |
| Cu whiskers                                                           | VP      | 0,2x0,2x40                             | 2/XI Intern. Congress of Crystallography<br>August 3-12, Warsaw 1978                                                 | +                                    |
| Ag whiskers                                                           | VP      | 0,05x0,05x10                           | Collected Abstracts S223, ibid S250                                                                                  | +                                    |
| Co whiskers                                                           | VP      | 0,2x0,2x10                             | 3/Sc. papers of Silesian Univ. 1 /1976/ 21                                                                           | +                                    |
| Cd whiskers                                                           | Sub     | 0,02x0,02x5                            | 4/Kristal i Technik 4 /1976/ 399                                                                                     | +                                    |
| Zn whiskers                                                           | Sub     | 0,02x0,02x5                            | 5/Acta Phys. Polonica A39/2 /1971/ 189                                                                               | +                                    |

| <b>425</b><br>Name(s): Andrzej Giebarczyk<br>Inst. & Address: Uniwersytet Śląski, Instytut Fizyki, 40-007 Katowice, Poland Telephone: 588211 |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                        | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Material<br>Avail-<br>ability<br>+ - |
| GdMn <sub>2</sub> - GdAl <sub>2</sub>                                                                                                        | M       | globule<br>diameter<br>about 5mm       | Purities of the constituents Gd, Mn, and Al were 99.5, 99.99 and 99.999% respectively. X-ray analysis of the polycrystals obtained did not reveal the presence of any foreign phase. The X-ray structural analysis has revealed that the samples were homogeneous. The character of the magnetic ordering of GdMn <sub>2</sub> -GdAl <sub>2</sub> results from the influence of the free-electron concentration and ordering on crystallographic sites (magnetic measurements and X-ray analysis).<br><br>X-ray emission band spectra (SXS) of manganese, aluminum, and gadolinium have been investigated. The transfer of the 3d electrons of Mn to the Gd atom was observed. This suggests an ionic character of chemical bonding in the compound investigated.<br><br>Publications:<br>J. Less-Common Met. 57, 567 (1978); 59, 1 (1978)<br>Phys. Stat. Sol. (a) 36, K171 (1976); 46, K29 (1978)<br>Inst. Phys. Conf. Ser. No. 39, 393 (1978)<br>Phys. Stat. Sol. (will be published)<br><br>All polycrystalline samples were prepared by arc melting in an argon atmosphere and subsequently annealing at 1100K |                                      |

| <b>426</b><br>Name(s): E. Burzo<br>Inst. & Address: Central Institute of Physics, P.O.Box 5206 Bucharest-Romania Telephone: |         |                                        |                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                       | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Rare-earth intermetallic compounds                                                                                          | M       |                                        | Characterization by magnetic measurements, Mössbauer effect, magneto-resistivity, EPR, FMR.                          | -                                    |
| Metallic solid solution of transition elements                                                                              | M       |                                        |                                                                                                                      | -                                    |
| Magnetic glasses                                                                                                            | M       |                                        |                                                                                                                      | -                                    |
| Binary systems based on V <sub>2</sub> O <sub>5</sub>                                                                       | M       |                                        |                                                                                                                      | -                                    |
| Superconducting materials                                                                                                   | M       |                                        |                                                                                                                      | -                                    |

| <b>427</b><br>Name(s): I. Ursu<br>Inst. & Address: Central Institute of Physics, P.O.Box 5206 Bucharest-Romania Telephone: |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                      | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Uranium compounds                                                                                                          |         |                                        | Characterization by EPR, NMR, FMR                                                                                    | -                                    |
| Paramagnetic centers in ionic crystals (irradiated and unirradiated)                                                       | Cz      |                                        |                                                                                                                      | -                                    |
| Ferroelectrics                                                                                                             | S       |                                        |                                                                                                                      | -                                    |
| Intermetallic compounds                                                                                                    | M       |                                        |                                                                                                                      | -                                    |

| 428                                                                                                               |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |
|-------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Prof. J.S. Vermaak and Co-workers                                                                        |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |
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| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                                                                         | Material<br>Avail-<br>ability<br>+ - |
| GaAs/GaAlAs Single and Double Hetero-<br>structures                                                               | LE      | 10 x 10 x 0.5                          | Dis. dens. $< 10^3/\text{cm}^2$ ; (001) substrate orientation;<br>Various p- and n-type dopants; Electrical, optical<br>and mechanical properties; TEM, SEM, X-rays, Auger,<br>Optical and I.R. Birefringe microscopy, photolumi-<br>nescence characterization: LED, Laser, solar cells;<br>J. Appl. Phys. <u>48</u> , 3008 (1977); <u>49</u> , 1149 (1978);<br><u>49</u> , 2975 (1978); <u>49</u> , 1173 (1978); J. Cryst. Growth<br><u>42</u> , 132 (1977) | -                                    |

| 429                                                                              |         |                                        |                                                                                                                      |                                      |
|----------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): YEONG DER YAO                                                           |         |                                        |                                                                                                                      |                                      |
| Inst. & Address: Institute of Physics, Academia Sinica, Taipei, Taiwan, R.O.C.   |         |                                        | Telephone: 7614170 Ext. 284                                                                                          |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)            | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Ni <sub>1-x</sub> Bi <sub>x</sub> (x ≤ 50 at.%)                                  | M       | 2x2x20                                 | to be published                                                                                                      | +                                    |
| Bi <sub>1-x</sub> Sb <sub>x</sub> (x ≤ 50 at.%)                                  | Z       | 2x2x20                                 | to be published                                                                                                      | +                                    |
| Ni <sub>1-x</sub> Cu <sub>x</sub> (x = 0, 4.6, 9.3, 14.0 and<br>18.8 at.%)       | M       | 2x2x15                                 | to be published                                                                                                      | +                                    |
| Ni <sub>1-x</sub> Ti <sub>x</sub> (x = 0, 0.5, 0.8, 1.0 and<br>1.5 at.%)         | M       | 3x3x30                                 | Chinese Journal of Physics <u>15</u> , 1 (1977)                                                                      | +                                    |
| Al-B (containing 60 vol% uniaxial<br>boron fibres)                               |         | 2x2x15                                 | Fibre Science and Technology <u>10</u> , 313 (1977)                                                                  | -                                    |
| Pd <sub>1-x</sub> Ag <sub>x</sub> (x = 30.0, 34.8, 40.0, 44.3,<br>and 49.9 at.%) | M       | 1x1x20                                 | Physical Review B <u>15</u> , 2429 (1977)                                                                            | -                                    |

| 430                                                                                            |              |                                        |                                                                                                                      |                                      |
|------------------------------------------------------------------------------------------------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name(s): Sung-Shan Jao                                                                         |              |                                        |                                                                                                                      |                                      |
| Inst. & Address: Institute of Nuclear Energy Research, P.O.Box 3-11, Lungtan, Taiwan, R. O. C. |              |                                        | Telephone: (02)3814014 X. 2231                                                                                       |                                      |
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                          | METHOD*      | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| 1. NaCl, KCl, KBr, KBr <sub>0.33</sub> +<br>KCl <sub>0.67</sub>                                | <u>Cz</u>    | 130 * x 50<br>100 * x 80<br>75 * x 50  | Publication in "Nuclear Science Journal"<br>Vol. 13, No. 3, Sept. 1976                                               | -                                    |
| 2. Ge, Si                                                                                      | <u>Cz, Z</u> | 20 * x 60<br>25 * x 80<br>30 * x 70    | Publication in "Nuclear Science Journal"<br>Vol. 13, No. 3, Sept. 1976                                               | -                                    |
| 3. Al, Cu                                                                                      | <u>Br</u>    | 30 * x 90<br>25 * x 50<br>20 * x 50    | Publication in "Material Science Quarterly"<br>Vol. 8, No. 3, Sept. 1976                                             | -                                    |
| 4. SiO <sub>2</sub>                                                                            | <u>Hyd</u>   | 40x30x10<br>40x25x5<br>40x15x10        | To instruct a graduate student as a thesis<br>for the degree of master of science                                    | -                                    |

| <b>431</b><br>Name(s): Y. C. Chiou, S. Chang, S. Y. Lee, L. C. Chen, H. J. Yu, W. S. Feng, Y. N. Lai<br>Inst. & Address: National Taiwan University, Dept. of Electrical Eng., Taipei, Telephone:(02)3415251<br>Taiwan, Rep. of China |         |                                        |                                                                                                                      |                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                 | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| 1. Thick-film                                                                                                                                                                                                                         |         | 30x50x1                                | Properties studied, characterization,<br>application.                                                                |                                      |
| 2. GaAs <sub>1-x</sub> P <sub>x</sub> on GaAs, GaP & Si<br>studies                                                                                                                                                                    | VPE     | 15x10x0.1                              | Purity, properties studied, characteriza-<br>tion.                                                                   |                                      |
| 3. Ga <sub>1-x</sub> Al <sub>x</sub> As on GaAs studies                                                                                                                                                                               | LE      | 10x10x0.1                              | Purity, dopants, properties studied, charac-<br>terization.                                                          |                                      |

| <b>432</b><br>Name(s): C. Y. Sun<br>Inst. & Address: Union Industrial Research Laboratories, Industrial Technology Telephone:(035) 245141<br>Research Institute, Hsinchu, Taiwan 300 |          |                                        |                                                                                                                      |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                | METHOD*  | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
| Gallium Phosphide Single Crystals<br>GaP on GaP wafers                                                                                                                               | Cz<br>LE | 5 cmφ x 10<br>cmL                      | five 9's, {111}, Sulfur doped.                                                                                       | -<br>-                               |

| <b>433</b><br>Name(s): Jugoslav Todorović<br>Inst. & Address: "Boris Kidrič" Institute of Nuclear Sciences, Belgrade, Vinča Telephone:<br>Yugoslavia |         |                                        |                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                                                                                                                                                                                                                                                       | Material<br>Avail-<br>ability<br>+ - |
| Mn <sub>1.98</sub> Cr <sub>0.12</sub> Sb                                                                                                             | Cz      | 34x9x5                                 | a=4.08 Å, c=6.52 Å<br>Mn <sub>I</sub> (2a), Mn <sub>II</sub> (2c) z=0.295,<br>Sb(2c) z=-0.28<br>T<318K, Antiferromagnetic (a,a,2c)<br>Magnetic moments parallel to the<br>(001) plane<br>T>318K, Ferrimagnetic (a,a,c)<br>Magnetic moments parallel to the c-axis<br>Magnon soft mode (Solid State Comm.<br>21, 919(77)<br>Antiferromagnetic incommensurate su-<br>perlattice at 290K<T<318K (to be publ.) | +                                    |

434

Name(s): M. Stubicar

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41001 Zagreb, Jugoslaviya

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name) | METHOD*          | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc. | Material<br>Avail-<br>ability<br>+ - |
|-----------------------------------------------------------------------|------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Aluminum (Al)                                                         | Strain<br>Anneal | 50 x 1 mm<br>(diam.)                   | J. Inst. Metals 98, 64 (1970)                                                                                        |                                      |

435

Name(s): H. Pollak § Ph. Le Docte

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Département de Physique, B.P. 190 Kinshasa XI (Zaïre)

Telephone:

| MATERIALS PREPARED OR STUDIED<br>(Formula & Technical or Common Name)                                                                                                                                                                                                                                                                             | METHOD* | THREE<br>MAXIMUM<br>DIMENSIONS<br>(mm) | COMMENTS: Purity, orientation, dopants,<br>properties studied, characterization,<br>applications, publications, etc.                                                        | Material<br>Avail-<br>ability<br>+ - |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| $\left[ \text{Fe} \begin{smallmatrix} (\text{RCOO}) \\ 3 \end{smallmatrix} \right] \begin{smallmatrix} (\text{RCOO}) \\ 6 \end{smallmatrix} \begin{smallmatrix} (\text{RCOO}) \\ 3 \end{smallmatrix}$ <p>with R = CH<sub>3</sub><br/> C H CH<br/> 6 5 2<br/> Cl CH<br/> 2<br/> Cl CH<br/> 2<br/> F C<br/> 3<br/> Cl C<br/> 3<br/> Br C<br/> 3</p> | SOL     | 2x2x3 mm                               | <ul style="list-style-type: none"> <li>° X-ray studies</li> <li>° Mössbauer-studies :<br/>quadrupole splitting as a function of<br/>inductive effects (Taft's σ)</li> </ul> | +                                    |

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