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U.S. DEPARTMENT OF ENERGY
FOSSIL ENERGY
ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT

PUBLICATIONS

OF THE

FOSSIL ENERGY
ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT
MATERIALS PROGRAM

April 1, 1991, through March 31, 1993

Compiled by

Paul T. Carlson

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PREVIOUS REPORTS IN THIS SERIES

P. T. Carlson, *Fossil Energy Materials Program Consolidated Bibliography of Publications, October 1, 1979, through April 30, 1986*, ORNL/FMP-86/5, Oak Ridge National Laboratory, Oak Ridge, TN, August 1986.

P. T. Carlson, *Fossil Energy Materials Program Consolidated Bibliography of Publications, October 1, 1979, through April 30, 1987*, ORNL/FMP-87/3, Oak Ridge National Laboratory, Oak Ridge, TN, September 1987.

P. T. Carlson, *Fossil Energy Materials Program Consolidated Bibliography of Publications, May 1, 1987, through May 31, 1989*, ORNL/FMP-89/3, Oak Ridge National Laboratory, Oak Ridge, TN, June 1989.

P. T. Carlson, *Publications of the Fossil Energy Advanced Research and Technology Development Materials Program, June 1, 1989, through March 31, 1991*, ORNL/FMP-91/3, Oak Ridge National Laboratory, Oak Ridge, TN, June 1991.

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PUBLICATIONS OF THE FOSSIL ENERGY ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT MATERIALS PROGRAM*

April 1, 1991, through March 31, 1993

Compiled by
Paul T. Carlson

1. INTRODUCTION

The objective of the Fossil Energy Advanced Research and Technology Development (AR&TD) Materials Program is to conduct research and development on materials for fossil energy applications, with a focus on the longer-term needs for materials with general applicability to the various fossil fuel technologies. The Program includes research aimed at a better understanding of materials behavior in fossil energy environments and on the development of new materials capable of substantial improvement in plant operations and reliability. The scope of the Program addresses materials requirements for all fossil energy systems, including materials for coal preparation, coal liquefaction, coal gasification, heat engines and heat recovery, combustion systems, and fuel cells. Work on the Program is conducted at national and government laboratories, universities, and industrial research facilities. The research conducted on the Program is divided among the following areas: (1) ceramics, (2) new alloys, (3) corrosion research, and (4) program development and technology transfer. A schematic of the AR&TD Materials Program structure is shown in Figure 1.

This bibliography covers the period of April 1, 1991, through March 31, 1993, and is a supplement to previous bibliographies in this series (see page iii).

It is the intent of this series of bibliographies to list only those publications that can be conveniently obtained by a researcher through relatively normal channels. The publications listed in this document have been limited to topical reports, open literature publications in refereed journals, full-length papers in published proceedings of conferences, full-length papers in unrefereed journals, and books and book articles. Oral presentations, periodic progress reports, management reports, letter reports, abstracts, and summaries have not been included.

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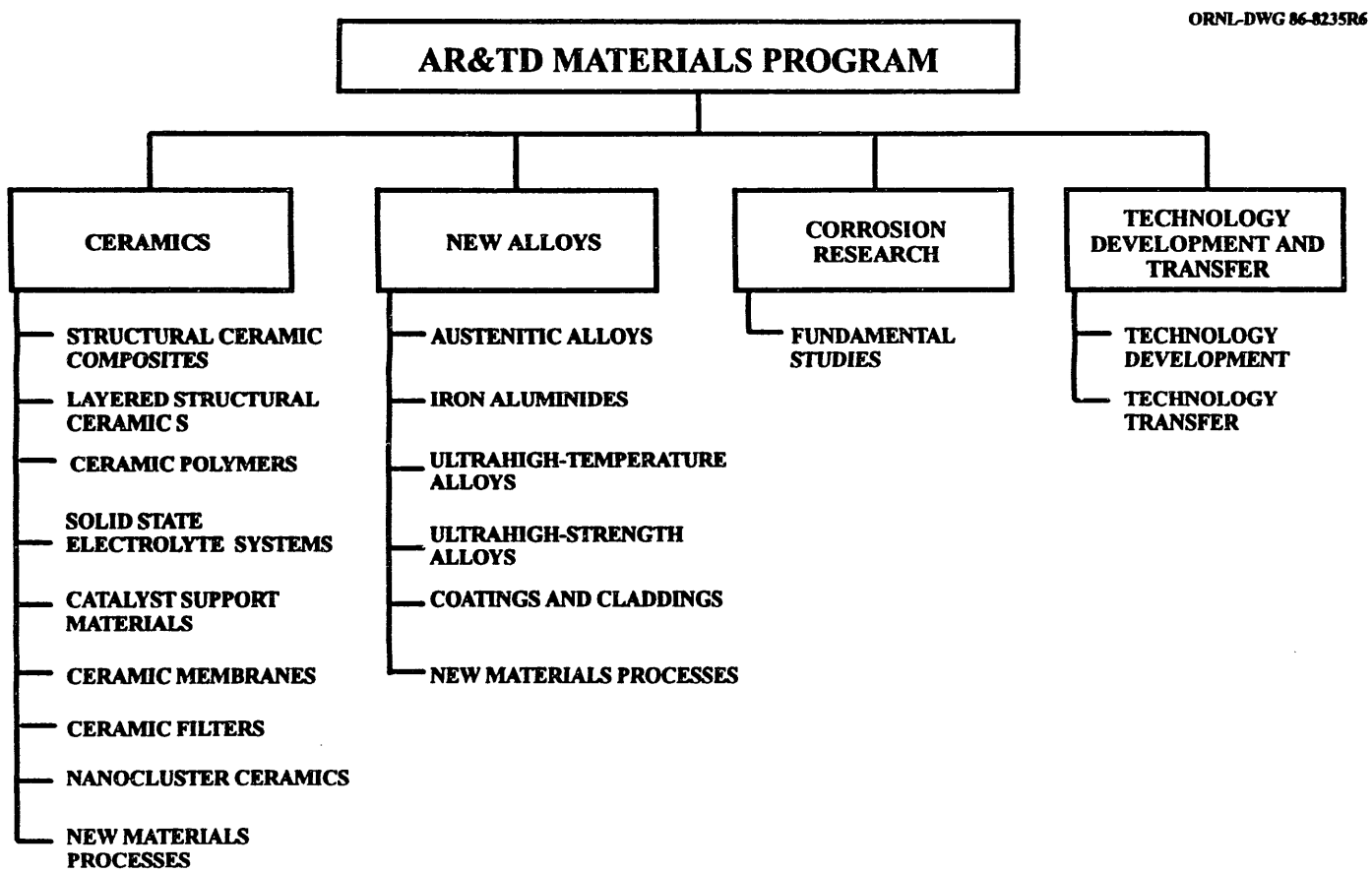

Fig. 1 Organization of research activities on the AR&TD Materials Program.

The acronym(s) in brackets immediately following each citation refer to the organization(s) at which the work was performed. The organizational acronyms used in this bibliography are:

3M	3M Company
ANL	Argonne National Laboratory
B&W	Babcock & Wilcox Company
CARB	The Carborundum Company
CSM	Colorado School of Mines
CU	Cornell University
FW	Foster Wheeler Development Corporation
GT	Georgia Institute of Technology
INEL	Idaho National Engineering Laboratory
K25	Oak Ridge K-25 Site
LBL	Lawrence Berkeley Laboratory
NCAT	North Carolina A&T State University
NIST	National Institute of Standards and Technology
ORNL	Oak Ridge National Laboratory
OSU	Ohio State University
PNL	Pacific Northwest Laboratories
RPI	Rensslaer Polytechnic Institute
SNL	Sandia National Laboratories
UCIN	University of Cincinnati
UND	University of Notre Dame
UP	University of Pittsburgh
UT	University of Tennessee
VPI	Virginia Polytechnic Institute and State University
WHC	Westinghouse Hanford Company

2. PROGRAM DEVELOPMENT AND TECHNOLOGY TRANSFER

2.1 GENERAL PROGRAM

2.1.1 Open Literature Publications

K. Natesan, "Historical Perspectives on Fossil Energy Materials R&D," *Materials & Components in Fossil Energy Applications* **100**, 4 (October 1992) [ANL].

2.2 TECHNOLOGY TRANSFER

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L. R. White and T. M. Kafka, *Fabrication of Commercial-Scale Fiber-Reinforced Hot-Gas Filters by Chemical Vapor Deposition*, ORNL/Sub/89-SB482/01, 3M Company, St. Paul, MN, November 1992 [3M].

2.2.2 Open Literature Publications

William E. Hollar, Jr., and J. J. Kim, "Review of VLS SiC Whisker Growth Technology," *Ceram. Eng. Sci. Proc.*, **12**, 979-91 (July/August 1991) [CARB].

2.2.3 Papers in Conference Proceedings

William E. Hollar, Jr., G. DeMunda, J. Kim, and W. Mills, "Engineering Scale Development of the Vapor-Liquid-Solid (VLS) Process for the Production of Silicon Carbide Fibrils," pp. 31-40 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, May 12-14, 1992, ORNL/FMP-92/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, July 1992 [CARB].

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3. METALS AND ALLOYS

3.1 ALLOY DEVELOPMENT

3.1.1 Topical Reports

R. W. Swindeman, *The Potential of Modified Type 310 Stainless Steel for Advanced Fossil Energy Applications,* ORNL-TM-12057, Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory, March 1992 [ORNL].

J. R. Weir, Jr., and V. K. Sikka, *Primary Fabrication Processes for Nickel and Iron Aluminides*, SAE Technical Paper No. 912194, SAE International, Warrendale, PA, 1991 [ORNL].

3.1.2 Open Literature Publications

J. R. Knibloe, R. N. Wright, V. K. Sikka, R. H. Baldwin, and C. R. Howell, "Elevated Temperature Behavior of Fe_3Al with Chromium Additions," *Mater. Sci. Eng.* **A152**, 382-86 (1992) [INEL, ORNL].

P. J. Maziasz and C. G. McKamey, "Microstructural Characterization of Precipitates Formed During High-Temperature Testing and Processing of Iron-Aluminide Alloys," *Mater. Sci. Eng.* **A152**, 322-34 (1992) [ORNL].

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P. G. Sanders, V. K. Sikka, C. R. Howell, and R. H. Baldwin, "A Processing Method to Reduce Environmental Embrittlement in Fe_3Al-Based Alloys," *Scr. Metall.* **25**, 2365-69 (1991) [ORNL].

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V. K. Sikka and R. H. Baldwin, "Creep-Rupture Properties of Fe_3Al-Based Iron-Aluminide Alloys," *SAMPE Q.* **24**(1), 2-9 (1992) [ORNL].

S. Vyas, S. Viswanathan, and V. K. Sikka, "Effect of Aluminum Content on Environmental Embrittlement in Binary Iron-Aluminum Alloys," *Scr. Metall.* **27**, 185-90 (1992) [ORNL].

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C. T. Liu, "Development of Cr_2Nb Intermetallic Alloys for High-Temperature Structural Use," pp. 375-83 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 12-14, 1992, ORNL/FMP-92/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, July 1992 [ORNL].

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C. G. McKamey and P. J. Maziasz, "Alloy Development of Fe_3Al for Improved Creep Rupture Properties," pp. 175-85 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [ORNL].

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V. K. Sikka, "Production of Fe_3Al-Based Intermetallic Alloys," pp. 907-12 in *High Temperature Ordered Intermetallics IV* proceedings of a symposium held in Boston, MA, November 26 - December 1, 1990, Vol. 213, ed. L. A. Johnson, D. P. Pope, and J. O. Stiegler, Materials Research Society, Pittsburgh, 1991 [ORNL].

V. K. Sikka, "Development of Nickel and Iron Aluminides and Their Applications," to be published in *Proceedings of the 30th Annual CIM Conference of Metallurgists International Symposium on Advances in Gas Turbine Engine Materials*, Canadian Institute of Mining, Metallurgy and Petroleum, Montreal, Quebec, Canada, 1991 [ORNL].

V. K. Sikka, R. H. Baldwin, K. S. Blakely, E. C. Hatfield, C. R. Howell, and C. G. McKamey, "Preparation and Fabrication of Iron Aluminides," pp. 197-207 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, Septemoer 1991 [ORNL].

V. K. Sikka, R. H. Baldwin, J. H. Reinshagen, J. R. Knibloe, and R. N. Wright, "Powder Processing of Fe_3Al-Based Iron Aluminide Alloys," pp. 901-6 in *High Temperature Ordered Intermetallics IV* proceedings of a symposium held in Boston, MA, November 26 - December 1, 1990, Vol. 213, ed. L. A. Johnson, D. P. Pope, and J. O. Stiegler, Materials Research Society, Pittsburgh, 1991 [ORNL].

V. K. Sikka and S. Viswanathan, "Fabrication and Processing of Iron Aluminides," pp. 195-206 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 12-14, 1992, ORNL/FMP-92/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, July 1992 [ORNL].

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V. K. Sikka, R. H. Baldwin, C. R. Howell, and J. H. Reinshagen, "P/M Processing and Applications of Fe_3Al-Based Intermetallics," pp. 147-58 in *Advances in Powder Metallurgy - 1991*, Vol. 6, ed. Leander F. Pease, III, and Reynald J. Sansoucy, Metal Powder Industries Federation and American Powder Metallurgy Institute, Princeton, NJ, 1991 [ORNL].

V. K. Sikka, B. G. Gieseke, and R. H. Baldwin, "Mechanical Properties of Fe_3Al-Based Alloys," pp. 363-71 in *Heat-Resistant Materials*, ed. K. Natesan and D. J. Tillack, ASM International, Materials Park, OH, 1991 [ORNL].

3.2 MECHANICAL PROPERTIES

3.2.1 Topical Reports

P. D. Ferro, B. Yost, R. W. Swindeman, and Che-Yu Li, *Deformation and Thermal Fatigue in High-Temperature Austenitic Alloys*, ORNL/Sub/85-27488/05, Cornell University, Ithaca, NY, March 1991 [CU].

3.2.2 Open Literature Publications

A. Castagna and N. S. Stoloff, "The Influence of Environment on Fatigue Crack Growth of an Fe_3Al,Cr Alloy", *Scr. Metall.* 26, 325-30 (March 1992) [RPI].

3.2.3 Papers in Conference Proceedings

D. J. Alexander and V. K. Sikka, "Fracture Behavior of Fe_3Al Alloy FA-129," pp. 239-48 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [ORNL].

A. Castagna and N. S. Stoloff, "Investigation of Moisture-Induced Embrittlement of Iron Aluminides," pp. 249-59 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [RPI].

A. Castagna and N. S. Stoloff, "Investigation of Moisture-Induced Embrittlement of Iron Aluminides," pp. 305-14 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, Oak Ridge, Tennessee, May 12-14, 1992, ed. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, Oak Ridge, TN, July 1992 [RPI].

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R. W. Swindeman, "Creep Response of a 9Cr-1Mo-V-Nb Steel to Varying Stresses and Temperatures," pp. 900-13 in *Proceedings of the International Conference on Pressure Vessel Technology 7*, Dusseldorf, Germany, 1992 [ORNL].

R. W. Swindeman and P. J. Maziasz, "The Effect of MC Forming Additions and 10% Cold Work on High Temperature Strength of 20Cr-30Ni-Fe Alloys," pp. 251-60 in *Heat Resistant Materials: Proceedings of the First International Conference*, Lake Geneva, WI, September 22-26, 1991, ed. K. Natesan and D. J. Tillack, ASM International, Materials Park, OH, 1991 [ORNL].

3.2.4 Books and Book Articles

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N. S. Stoloff, "Cyclic Deformation of Intermetallic Alloys", pp. 257-77 in *Ordered Intermetallics - Physical Metallurgy and Mechanical Behavior*, ed. C. T. Liu, R. W. Cahn, and G. Sauthoff, Kluwer Academic Publishers, Dordrecht, The Netherlands, 1992 [RPI].

3.3 FABRICATION

3.3.1 Topical Reports

Mark J. Topolski, *Evaluation of the Fabricability of Advanced Austenitic Tubing*, ORNL/Sub/88-SB775/02, Babcock & Wilcox, Alliance, OH, March 1991 [B&W].

3.3.2 Open Literature Publications

J. K. Wright, R. N. Wright, and G. A. Moore, "Combustion Synthesized Iron Aluminide Coatings and Joints," *Scr. Metall. Mater.* 28(4), 501-6 (February 1993) [INEL].

J. R. Knibloe, R. N. Wright, V. K. Sikka, R. H. Baldwin, and C. R. Howell, "Elevated Temperature Behavior of Fe_3Al with Cr Additions," *Mater. Sci. Eng.* A153, 382-86 (1992) [INEL, ORNL].

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3.3.3 Papers in Conference Proceedings

H. D. Brody and L. L. Rishel, "Melting, Casting, and Solidification Behavior of Iron Aluminides," pp. 187-96 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [UP].

J. R. Knibloe and R. N. Wright, "The Influence of Thermomechanical Processing on Microstructure and Properties of Iron Aluminides," pp. 207-15 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 12-14, 1992, ORNL/FMP-92/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, July 1992 [INEL].

W. R. Mohn and M. J. Topolski, "Evaluation of the Fabricability of Advanced Iron Aluminide-Clad Austenitic Stainless Steel Tubing," pp. 337-43 in *Proceedings of the Sixth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 12-14, 1992, ORNL/FMP-92/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, July 1992 [B&W].

M. J. Topolski, "Fabrication of Advanced Austenitic Alloy Superheater Tubing," pp. 223-32 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [B&W].

R. N. Wright, "Microstructure and Properties of Iron Aluminides," in *Proceedings of the Canadian Institute of Metallurgists Symposium on High Temperature Materials*, Ottawa Canada, 1991, in press [INEL].

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3.4.1 Topical Reports

D. I. Ash, G. R. Edwards, and S. A. David, *Weldability and Hot Ductility of Iron Aluminides*, ORNL/Sub/85-27421/04, Center for Welding and Joining Research, Colorado School of Mines, Golden, CO, May 1991 [CSM, ORNL].

A. A. Fasching, G. R. Edwards, and S. A. David, *Grain Growth Kinetics of Iron Aluminide Alloy FA-129*, ORNL/Sub/85-27421/05, Center for Welding and Joining Research, Colorado School of Mines, Golden, CO, February 1993 [CSM, ORNL].

C. D. Lundin, C. Y. P. Qiao, Y. Kikuchi, C. Shi, and T. P. S. Gill, *Investigation of Joining Techniques for Advanced Austenitic Alloys*, ORNL/Sub/88-07685/02, University of Tennessee, Knoxville, TN, May 1991 [UT].

C. D. Lundin and C. Y. P. Qiao, *Evaluation of HAZ Liquation Cracking Susceptibility and HAZ Softening Behavior in Modified 800H*, ORNL/Sub/88-07685/03, University of Tennessee, Knoxville, TN, November 1992 [UT].

3.4.2 Open Literature Publications

M. C. Maguire, G. R. Edwards, and S. A. David, "Weldability and Hot Ductility of Chromium-Modified Ni_3Al Alloys," *Weld. J.* 71(7), 231s-242s, July 1992 [CSM, ORNL].

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D. I. Ash, A. A. Fasching, G. R. Edwards, and S. A. David, "Investigation of the Weldability of Polycrystalline Iron Aluminides," pp. 209-17 in *Proceedings of the Fifth Annual Conference on Fossil Energy Materials*, Oak Ridge, TN, May 14-16, 1991, ORNL/FMP-91/1, comp. N. C. Cole and R. R. Judkins, Oak Ridge National Laboratory, September 1991 [CSM, ORNL].

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