

LA-UR- 11-03701

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*Title:* Materials Capability Review 2011 notebook

*Author(s):* Wendy R. Cieslak

*Intended for:* Materials Capability Review



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Date: 6/23/11  
Jeane Strub

**LA-UR-11-03701**

The Materials Capability Review 2011  
notebook is being archived in the  
Materials Science & Technology Division  
Office

# Materials Capability Review

Los Alamos National Laboratory

May 31 - June 3, 2011



On the cover: Phase-field simulation of gas bubble nucleation and evolution (helium, yellow) in a polycrystalline material (uranium oxide, blue) showing nearly continuous coverage of the grain boundaries plus scattered interior sites.

# Contents

## 2011 Materials Capability Review Committee

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## Agenda

Materials Capability Review Charter  
Committee Instructions for Los Alamos  
National Laboratory Capability Reviews

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## Materials Overview

- W.R. Cieslak

## Materials for the Future

- A.J. Taylor

MaRIE, an Experimental Facility  
Concept for Revolutionizing Materials  
in Extreme Environments

- J.L. Sarrao

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## LDRD-DR Review - J. Martinez

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## Materials in Radiation Environments

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## Nuclear Energy: Actinide Focus

D. Teter, C. Stanek, A. Nelson  
Poster Abstracts

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## Materials for Clean Energy

D. Watkins, V. Klimov, R. Borup  
Poster Abstracts

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## LANSCE Overview

K. Schoenberg

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Materials Capability Review Committee  
Members

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Materials Capability Review Theme  
Leaders, Presenters

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Wednesday

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Supplemental



# Agenda

## Materials Capability Review Los Alamos National Laboratory

**May 31-June 3, 2011**

***Hilton @ Buffalo Thunder 5<sup>th</sup> Floor Executive Lounge  
30 Buffalo Thunder Trail, Santa Fe, New Mexico***

**Tuesday Evening, May 31, 2011 (By Invitation Only)**

6:00 Opening Session – Committee Gathering and Reception

6:30 Director's Welcome and Committee Charge .....Duncan W. McBranch  
*PADSTE; Deputy Principle Associate Director, Science, Technology & Engineering*

7:00 ADEPS Welcome and Expectations.....Susan J. Seestrom  
*ADEPS; Associate Director, Experimental Physical Sciences*

7:15 Executive Session (*Committee Only*)..... Gary S. Was  
*Committee Chair*

**Purpose:**  
Institutional Host(s):  
Technical Host(s):  
Protocol POC:  
Catering:  
LANL Update:

**Annual Capability Review**  
Susan J. Seestrom, ADEPS, 505-665-4454  
Wendy R. Cieslak, MST-DO, 5-1535  
Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195  
ARAMARK  
505-667-6622 or 1-877-723-4101: Provided information about changes in the Laboratory schedule  
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Revised: 5/18/11 (jms)



Materials Capability Review

Wednesday, June 1, 2011

7:00 Meet visitors in lobby of the Hilton @ Buffalo Thunder ..... Peggy S. Vigil  
*CGA-GAO: PADSTE, Protocol*

7:05 Travel to LANL Badge Office, Bus leaves the hotel (*promptly @ 7:05*) LANS Taxi Service

7:30 Badge Office Processing ..... Peggy S. Vigil

8:00 Walk to J. Robert Oppenheimer Study Center (breakfast provided for committee)

***J. Robert Oppenheimer Study Center  
TA-3, Bldg. 207, Jemez/Cochiti Room***

8:05 Committee Photo ..... Robert W. Kramer  
*ADEPS Communications Team*

8:20 Welcome and Logistics ..... Susan J. Seestrom  
*ADEPS; Associate Director, Experimental Physical Sciences*

8:30 Overview of the Materials Capability at Los Alamos ..... Wendy R. Cieslak  
*MST-DO; Division Leader, Materials Science & Technology*

9:15 Materials for the Future: *Towards an Implementation Plan for the Materials Strategy* ..... Antoinette (Toni) Taylor  
*MPA-DO; Division Leader, Materials Physics & Applications*

9:55 MaRIE Update ..... T. Mark McCleskey  
*MPA-MC; Group Leader, Materials Chemistry*

10:25 Break

10:40 LDRD-DR Review: Predictive Design of Noble Metal Nanoclusters .... Jennifer Martinez  
*MPA-CINT; Scientist, Center for Integrated Nanotechnologies*

11:40 LDRD-DR Discussion led by ..... William Priedhorsky  
*LDRD-PO; Program Director, Laboratory Directed Research & Development*  
Including Susan Seestrom, Cathy Cleland, Wendy Cieslak, and Toni Taylor

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**Purpose:**

Institutional Host(s):

Technical Host(s):

Protocol POC:

Catering:

LANL Update:

**Annual Capability Review**

Susan J. Seestrom, ADEPS, 505-665-4454

Wendy R. Cieslak, MST-DO, 5-1535

Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195

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5/18/11(jms)



Materials Capability Review

# Agenda

**J. Robert Oppenheimer Study Center  
TA-3, Bldg. 207, Jemez/Cochiti Room**

12:00 Working Lunch with Early Career Staff and Postdocs (*By Invitation Only*)  
(*San Ildefonso Conference Room*)

1:30 Materials in Radiation Environments Overview ..... Jack S. Shlachter  
*T-DO; Deputy Division Leader, Theoretical Division*

2:00 Center for Materials at Irradiation and Mechanical Extremes (CMIME) Michael A. Nastasi  
*MPA-CINT; Laboratory Fellow, Center for Integrated Nanotechnologies*

2:30 Research Activities at the Ion Beam Materials Laboratory (IBML) ..... Yongqiang Wang  
*MST-8; Scientist, Structure/Property Relations*

3:00 Discussion and Questions ..... Jack S. Shlachter  
*T-DO; Deputy Division Leader, Theoretical Division*

3:15 Posters Presentations ..... Various Staff  
*Poster Titles and Presenters: See Appendix A, Page 8*

3:30 Poster Session  
*Santa Clara Gallery*

4:30 Executive Session (*Committee Only*) ..... Gary S. Was  
*Committee Chair*

5:30 Travel to the O Eating House Restaurant (*Committee Only*) ..... Taxi Service  
*86 Cities of Gold Rd., Santa Fe, NM, Phone 505-455-2000*

6:00 Hosted working Dinner (*By Invitation Only*)  
Fukushima Reactor Studies ..... R. Dasari Venkateswara (DV Rao)  
*D-DO; Division Leader, Decision Applications*

8:30 Travel to the Hilton @ Buffalo Thunder ..... Taxi Service

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**Purpose:**

**Annual Capability Review**

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Susan J. Seestrom, ADEPS, 505-665-4454

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Technical Host(s)

Wendy R. Cieslak, MST-DO, 5-1535

Revised:

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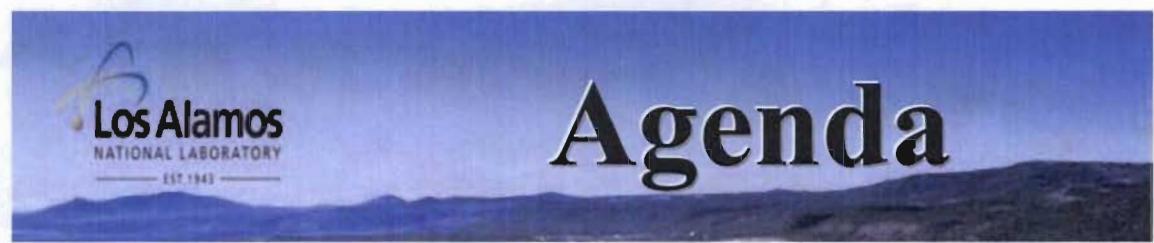
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Thursday, June 2, 2011

7:00 Meet visitors in lobby of the Hilton @ Buffalo Thunder ..... Peggy S. Vigil  
*CGA-GAO: PADSTE, Protocol*

7:05 Travel to LANL Study Center, Bus leaves the hotel (*promptly @ 7:05*) ..... Taxi Service

***J. Robert Oppenheimer Study Center  
TA-3, Bldg. 207, Jemez/Cochiti Room***

7:30 Voice of the Customer (*By Invitation Only*) (breakfast provided for committee)  
*(San Ildefonso Conference Room)*

9:00 **Materials for Nuclear Energy (Focus on Actinides)** Overview ..... David F. Teter  
*MST-DO; Deputy Division Leader, Materials Science & Technology*

9:30 Lower Length Scale Simulations of Fission Gas and Thermal Transport in Oxide Nuclear Fuel ..... Christopher R. Stanek  
*MST-8; Scientist, Structure/Property Relations*

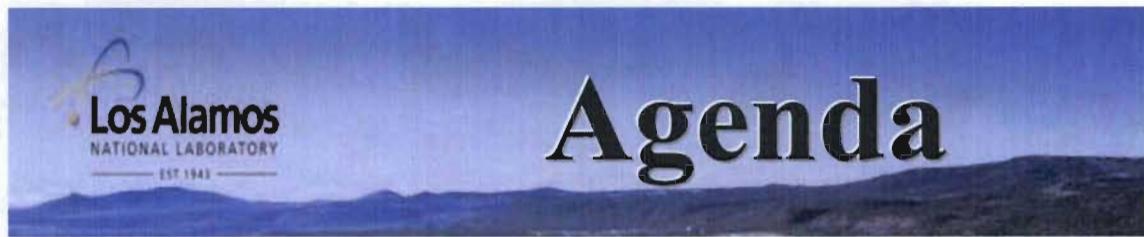
10:00 Development of Experimental Techniques to Augment Theory and Simulation of Thermal Transport in Oxide Nuclear Fuels ..... Andrew T. Nelson  
*MST-7; Scientist, Polymers & Coatings*

10:30 Discussion and Questions ..... David F. Teter  
*MST-DO; Deputy Division Leader, Materials Science & Technology*

10:45 Poster Presentation ..... Various Staff  
*Poster Titles and Presenters: See Appendix B, Page 9*

11:00 Poster Session  
*Santa Clara Gallery*

<b>Purpose:</b>	<b>Annual Capability Review</b>	<b>Classification Level:</b> Unclassified/Classified
Institutional Host(s):	Susan J. Seestrom, ADEPS, 505-665-4454	Dress: Business/Business Casual
Technical Host(s)	Wendy R. Cieslak, MST-DO, 5-1535	Revised: 5/18/11(jms)
Protocol POC:	Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195	
Catering:	ARAMARK	
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Materials Capability Review

# Agenda

*J. Robert Oppenheimer Study Center  
TA-3, Bldg. 207, Jemez/Cochiti Room*

12:00 Panel Discussion and Lunch (*Committee and Panel Only*)  
(*San Ildefonso Conference Room*)  
The Relationship of MaRIE and LANSCE to the Material Strategy ..... Panelists:  
Wendy R. Cieslak, facilitator  
Kurt F. Schoenberg  
John L. Sarrao  
Antoinette (Toni) Taylor

1:30 Materials for Clean Energy Overview ..... David E. Watkins  
*MPA-DO; Deputy Division Leader, Materials Physics & Applications*

2:00 Center for Advanced Solar Photophysics (CASP) ..... Victor I. Klimov  
*C-PCS; Laboratory Fellow, Chemistry, Physical Chemistry & Applied Spectroscopy*

2:30 Materials Development in the LANL Fuel Cell Program ..... Rodney L. Borup  
*MPA-11; Program Manager, Sensors & Electrochemical Devices*

3:00 Discussion and Questions ..... David E. Watkins  
*MPA-DO; Deputy Division Leader, Materials Physics & Applications*

3:15 Poster Presentations ..... Various Staff  
*Poster Titles and Presenters: See Appendix C, Page 10*

3:30 Poster Session  
*Santa Clara Gallery*

4:30 Executive Session (*Committee Only*)

6:00 Travel to the Hilton @ Buffalo Thunder ..... Taxi Service

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Institutional Host(s):

Susan J. Seestrom, ADEPS, 505-665-4454

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Technical Host(s)

Wendy R. Cieslak, MST-DO, 5-1535

Dress: Business/Business Casual

Protocol POC:

Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195

Revised:

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Catering:

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Friday, June 3, 2011

**LANSCE**  
**TA-53, Building 1, Rosen Auditorium**

7:30 Committee Members Arrive & Finalize Tour Access/Logistics ..... Gary S. Was  
(breakfast provided for committee) Committee Chair

7:45 LANSCE Overview ..... Kurt F. Schoenberg  
*ADEPS; Deputy Associate Director, Experimental Physical Sciences and LANSCE Director*

8:15 Travel to the Lujan Center ..... Taxi Service

8:30 LANSCE Tour Begins -Lujan Center ..... Alan J. Hurd  
*LANSCE-LC; Group Leader, Lujan Center*

9:00 Travel to pRAD

9:10 LANSCE Tour -pRAD ..... Alexander (Andy) Saunders  
*P-25; Deputy Group Leader, Subatomic Physics*

9:40 Travel: **Cleared to Building1**; Uncleared to Injector Building

***Cleared Committee Members Split Off for Classified Session shown in red***  
Uncleared Committee Members Session shown in black

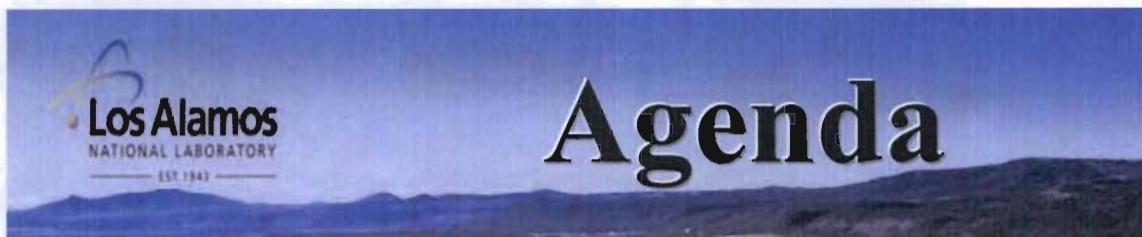
**SECURITY NOTICE:** Electronics, including cell phones, two-way pagers, PDA's (Blackberry, Palm Pilot, etc.), laptop computers, thumb-drives, cameras, etc. are **NOT** allowed in cleared Laboratory areas. It is suggested that visitors going behind the security fence leave all personal belongings in vehicles or hotel rooms or they will be subject to a complete search to include coats, briefcases, etc.

9:50 **Location: TA-53-1-D143**  
**Classified pRAD Session** ..... Christopher Morris  
*P-25; Laboratory Fellow, Subatomic Physics*

10:10 **Classified Poster Session** ..... Various Staff  
Poster Unclassified Titles and Presenters: Listed with Theme, pages 8 and 9

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Institutional Host(s):	Susan J. Seestrom, ADEPS, 505-665-4454	Dress: Business/Business Casual
Technical Host(s)	Wendy R. Cieslak, MST-DO, 5-1535	Revised: 5/18/11(jms)
Protocol POC:	Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195	
Catering:	ARAMARK	
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### *LANCSE Tour*

9:50 LANSCE Tour – Injector Building ..... John L. Erickson  
*AOT-DO; Division Leader, Accelerator Operations & Technology*

10:20 Return to Building 1 ..... Taxi Service

10:30 Committee Rejoins for Executive Session in A234 (*Committee Only*) ..... Gary S. Was  
*Committee Chair*

11:30 Lunch (*Closed Session*) ..... Terry C. Wallace Jr.  
*PADSTE; Principle Associate Director, Science, Technology & Engineering*

12:40 Committee Members to the Rosen Auditorium

***Rosen Auditorium  
TA-53, Building 1***

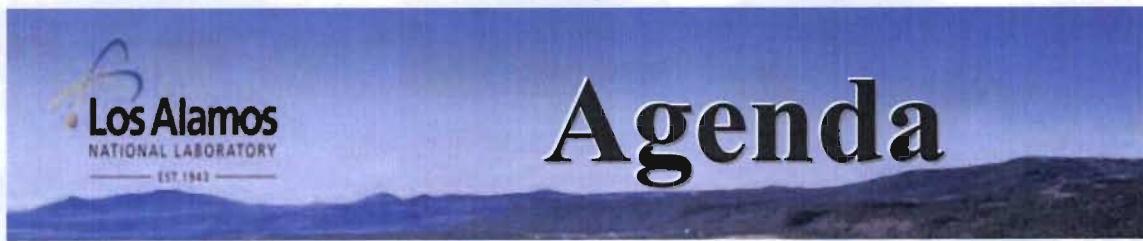
12:45 Formal Outbrief ..... Gary S. Was  
*Committee Chair*

2:00 Committee Members Depart

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<b>Purpose:</b>	<b>Annual Capability Review</b>		
Institutional Host(s):	Susan J. Sestrom, ADEPS, 505-665-4454	Classification Level:	Unclassified/Classified
Technical Host(s)	Wendy R. Cieslak, MST-DO, 5-1535	Dress:	Business/Business Casual
Protocol POC:	Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195	Revised:	5/18/11(jms)
Catering:	ARAMARK		
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Materials Capability Review

## APPENDIX A

### ***MATERIALS IN RADIATION ENVIRONMENTS POSTER SESSION, Wednesday, June 1, 2011***

Irradiation Environment in the Proposed Materials Test Station ..... Eric J. Pitcher  
*LANSCE-DO, LANSCE*

LANSCE: Nuclear Physics and Materials Science ..... John L. Ullmann  
*LANSCE-NS, Neutron & Nuclear Science*

The Role of Grain Boundaries in Modifying Radiation Damage Evolution in Simple Metals  
..... Blas P. Uberuaga  
*MST-8, Structure/Property Relations*

Atomistic Modeling and Experimental Studies of the Shock Response of Cu/Nb Nanolayered Composites ..... Ruifeng Zhang  
*T-3, Fluid Dynamics and Solid Mechanics*

Irradiation Damage Effects in Ceramic Oxides Induced by High Temperature and High Fluence Ion Beam Irradiation ..... Igor O. Usov  
*MST-7, Polymers & Coatings*

IBML Proton Calibration Results of the SABRS Energetic Particle Subsystems  
..... Jane M. Burward-Hoy  
*ISR-I, Space Science & Applications*

Effects of Radiation Environments on Long-Term Aging of Weapon Materials (U)  
..... Jennifer A. Lillard  
*MST-6, Materials Technology-Metallurgy*  
*Presented in Classified Session June 3, 2011*

Advanced Materials Development and Testing for Fuel Cycle Research and Development Program  
..... Osman Anderoglu  
*MST-8, Structure/Property Relations*

Influence of Interstitials or Vacancies on Grain Boundary Sliding Processes in bcc Tungsten  
..... Art F. Voter  
*T-1, Physics and Chemistry of Materials*

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Susan J. Seestrom, ADEPS, 505-665-4454

Technical Host(s)

Wendy R. Cieslak, MST-DO, 5-1535

Protocol POC:

Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195

Catering:

ARAMARK

LANL Update:

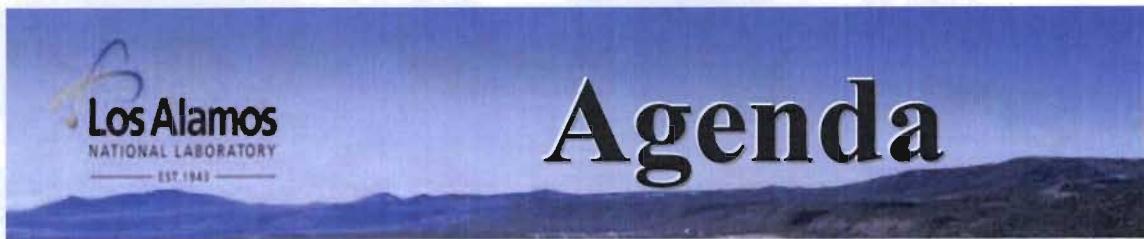
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5/18/11(jms)



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## **APPENDIX B**

### ***MATERIALS FOR NUCLEAR ENERGY (FOCUS ON ACTINIDES) POSTER SESSION, Thursday, June 2, 2011***

Sintering of Mixed-Oxide Fuel Pellets ..... Jeremy N. Mitchell  
*MST-16; Nuclear Materials Science*

Plutonium Science and Research Strategy: Use of Special Isotopes – 242Pu ..... Dom S. Peterson  
*MST-7, Polymers & Coatings*

Process Modeling of Plutonium and Uranium Casting ..... David A. Korzekwa  
*MST-6, Materials Technology-Metallurgy*

LEU U-10Mo Research Reactor Fuel Development and Scale Up ..... David E. Dombrowski  
*MST-6, Materials Technology-Metallurgy*

Residual Stresses in Aluminum Clad Uranium-10wt%molybdenum Fuel Plates  
..... Donald W. Brown  
*MST-8, Structure/Property Relations*

Chemical Segregation of U-10Mo Fuel Foils during Simulated Bonding Cycles Using Neutron Diffraction ..... Sven C. Vogel  
*LANSCE-LC; Lujan Center*

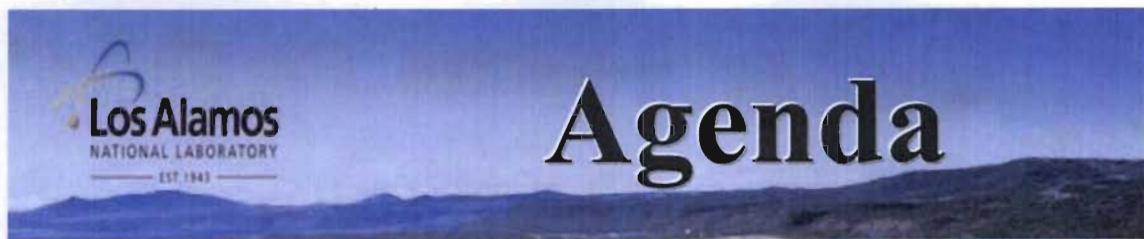
Radioparagenesis: Robust Nuclear Waste Form Design and Novel Materials Discovery  
..... Boris Dorado  
*MST-8, Structure/Property Relations*

Fissionable Scintillators for Measuring Neutron Flux ..... Ernst I. Esch  
*N-1, Safeguards Science and Technology*

Material Attractiveness in Nuclear Fuel Cycles (U) ..... Charles G. Bathke  
*D-5, International & Nuclear Systems Engineering*  
*Presented in Classified Session June 3, 2011*

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Materials Capability Review

## APPENDIX C

### **MATERIALS FOR CLEAN ENERGY POSTER SESSION, Thursday, June 2, 2011**

Colloidal Nanomaterials for Light Harvesting Applications.....Anshu Pandey  
*C-PCS; Physical Chemistry & Applied Spectroscopy*

Nanocrystals ..... John T. Stewart, IV  
*C-PCS; Physical Chemistry & Applied Spectroscopy*

Assessment of Silicon Nanowire Architecture for PV Application ..... Shadi Dayeh  
*MPA-CINT, Center for Integrated Nanotechnologies*

Controlling Electrode Morphology to Improve Fuel Cell Performance and Durability  
..... Cynthia F. Welch  
*MST-7, Polymers & Coatings*

Nanoscale Ceramic Catalyst Support Synthesis ..... Eric L. Brosha  
*MPA-11, Sensors & Electrochemical Devices*

Membrane Materials for Energy Applications ..... Katherine A. Berchtold  
*MPA-MC; Materials Chemistry*

Chemical H2 Storage Research at LANL ..... Benjamin L. Davis  
*MPA-MC; Materials Chemistry*

Comparative Studies of Vortex Physics in Oxide, Iron-arsenide and MgB2 Superconductors  
..... Leonardo Civale  
*MPA-STC; Superconductivity Technology Center*

Ions to Wires: The Science of High Tc Superconducting Wires..... Terry G. Holesinger  
*MPA-STC; Superconductivity Technology Center*

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Protocol POC:

Peggy S. Vigil, CGA-GAO, 7-8448 or cell 699-2195

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