



## ***Update on NSF – Part 2***

*Continuation from Ian Robertson on Day 1*

*Dr. Lynnette D. Madsen*

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Division of Materials Research (DMR)

Mathematical and Physical Sciences (MPS)

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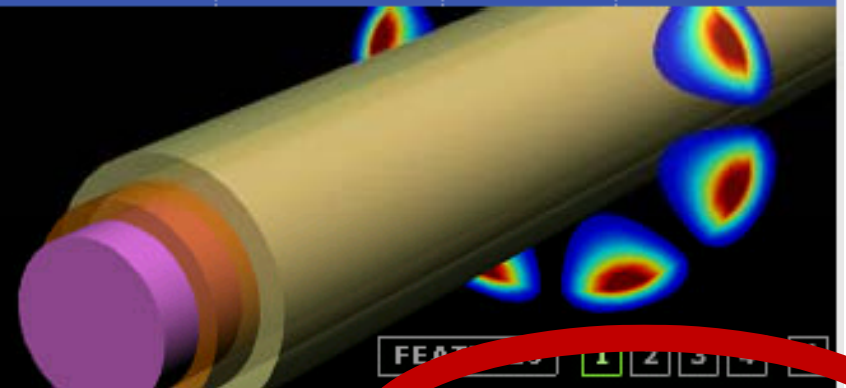
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[New Proposal & Award Policies & Procedures Guide](#) available!  
(effective for proposals submitted or due on or after January 18, 2011)

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# NSF Innovation Corps

- new initiative called NSF Innovation Corps, or I-Corps on launched on Thursday, July 28 at noon



# NSF Innovation Corps

- new effort: invest in new entrepreneurial talent & help develop scientific & engineering discoveries into useful technologies, products & processes. Tremendous opportunity for PIs to access resources to help determine commercial readiness of technology developed by **previously (past 5 Years) – or – currently-funded NSF projects**
- Partnership:
  - Kauffman Foundation
  - Deshpande Foundation



# NSF Innovation Corps

- Science to Start-Ups: [www.nsf.gov/i-corps](http://www.nsf.gov/i-corps)
- Solicitation #11-560
- \$50,000/ 6 mos. (incl. \$5K of indirect)
- Aug. 2: Live informational webinar via [www.nsf.gov/i-corps](http://www.nsf.gov/i-corps) (monthly thereafter)
- Aug. 17 to Sept. 9: Proposal submission window (quarterly thereafter); **you must have written OK to submit**
- Awardees: Participation in Curriculum in Oct. to Dec. time-period **required**

# NSF-NIST DCL

- Dear Colleague Letter 11-066;  
update to 2003 solicitation
- \$25,000 max. to cover travel and  
accommodation while undertaking collaborative  
research at NIST
- Very underutilized option in Ceramics

# Chemistry and Materials Research in Cultural Heritage Science (CHS)

- #11-528, will be updated
- Previously called SCIART; builds on 2009 Workshop
- Museum and university partnership addresses a grand challenge in cultural heritage science
- Last year of solicitation in FY 2012; after that apply to regular programs
- If your project doesn't fit: apply to regular programs

# Partnerships for International Research & Education (PIRE)

Solicitation 11-564

Preliminary Proposal Deadline: Oct. 19, 2011

Full Proposal May 15, 2012

- will focus exclusively on NSF-wide investment area of Science, Engineering, and Education for Sustainability (SEES)
- **primary goal**: support high quality projects in which advances in research & education could not occur without international collaboration



# Partnerships for Research and Education in Materials (PREM)

- Solicitation 11-562
- Full Proposal Deadline: October 25, 2011
- **Objective**: broaden participation & enhance diversity in materials research & education by stimulating the development of formal, long-term, multi-investigator, collaborative research and education partnerships between minority-serving colleges/universities & the NSF Division of Materials Research (DMR) supported centers, institutes, and/or facilities

# Signature Initiatives in Nanotechnology

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*Leading to a revolution in technology and industry that benefits society*

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## NNI Signature Initiatives

To accelerate nanotechnology development in support of the President's priorities and innovation strategy, OSTP and the NNI member agencies have identified areas ripe for significant advances through close and targeted program-level interagency collaboration. This collaboration now includes nanotechnology signature initiatives that are intended to enable the rapid advancement of science and technology in the service of national economic, security, and environmental goals by focusing resources on critical challenges and R&D gaps. These activities also leverage skills, resources, and capabilities among various agencies in a concerted effort to maximize scientific and technological progress. The nanotechnology signature initiatives are being developed in the context of all four NNI goals. They are intended to genuinely affect the agency budget process, as encouraged by Administration guidance, and to dramatically improve ground-level functional coordination between agencies.

### Related Resources

For more information on agency contributions to the Signature Initiatives, see the NNI's 2011 Strategic Plan.

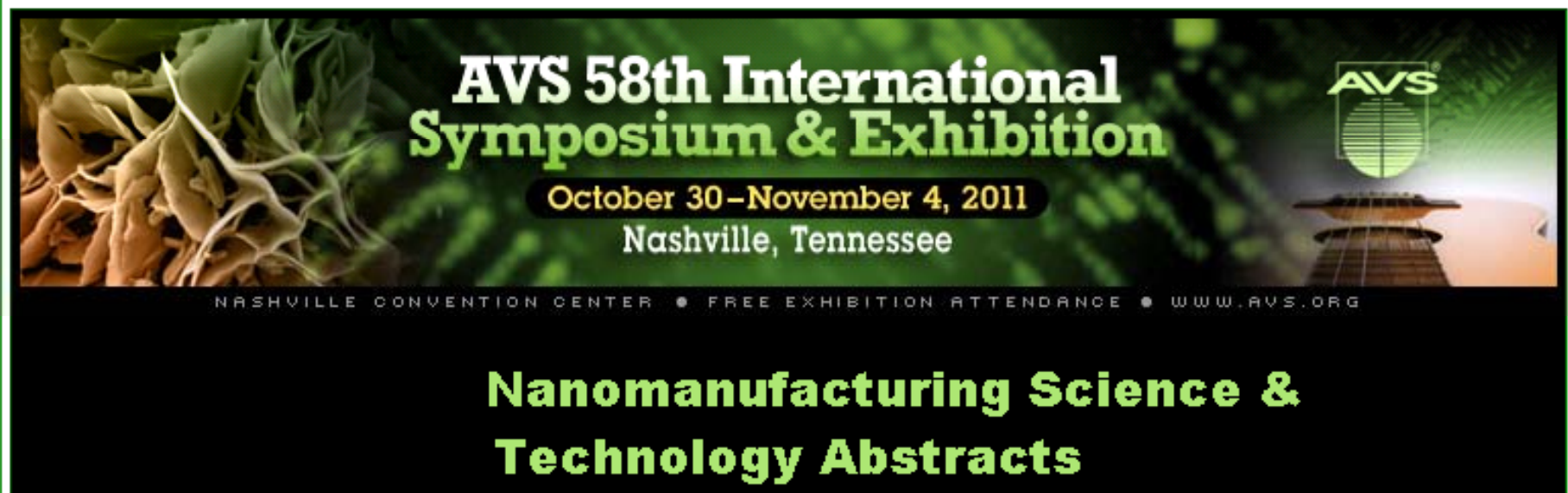
### Collaborations and Funding

- ✦ **Federal Government**
- ✦ **NNI Signature Initiatives**
  - Centers and Networks
  - User Facilities
  - Funding Opportunities
  - Current Solicitations
  - Commercialization
  - International Engagement

# Signature Initiatives in Nanotechnology

- Cross-agency
- FY 2011 budget, FY 2012, ....
- **SOLAR:** on-going annual competition: MPS (materials, chemistry and mathematics)
- **Nanoelectronics:** NEB (group activities)
- **Nanomanufacturing:** SNM (group activities)
  - Advanced Manufacturing is an area of interest/focus (nano or otherwise)
  - Special focus topic at upcoming AVS meeting at the end of October on nanomanufacturing

# Scalable Nanomanufacturing



**AVS 58th International Symposium & Exhibition**  
October 30–November 4, 2011  
Nashville, Tennessee

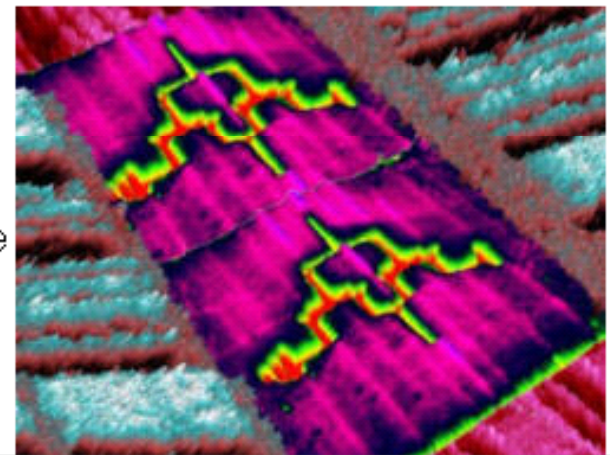
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**Nanomanufacturing Science & Technology Abstracts**

The banner features a green background with a microscopic view of plant roots on the left and a stylized AVS logo on the right. The text is centered and uses a mix of white and green colors.

## **Nanomanufacturing Science and Technology Focus Topic (NM)**

This topic highlights the AVS's strength in bringing together basic science and applied technology to support cutting edge industry. To move forward from bench-top demonstration to full-scale production, scalable, high-throughput, controllable processes are needed. In addition, development of characterization and metrology techniques able to support manufacturing of nanoscale materials and devices is needed. Presentations of work in the areas of scalable devices, top-down or bottom-up highthroughput processes, or metrology methods for sustainable nanomanufacturing are encouraged.



# AVS 58th International Symposium & Exhibition

October 30–November 4, 2011

Nashville, Tennessee



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### TOWNHALL MEETING: Federal Funding & Research Opportunities

Monday, October 31, 2011, 7:00 p.m.–8:45 p.m.

Belmont Ballroom, Renaissance Nashville Hotel

Open to ALL Symposium Attendees -- Refreshments provided

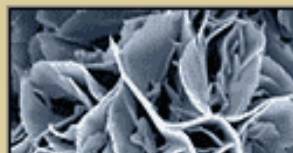
7:00 p.m. Introduction of Panelists Moderators:  
Drs. Ellen D Williams, BP and Glenn Glass, Intel

- Dr. James W Davenport: Department of Energy (DOE)
- Dr. Brian Holloway: Defense Advanced Research Projects Agency (DARPA)
- Drs. Ian M. Robertson, Lynnette D. Madsen, Z. Charles Ying & Sean L. Jones: National Science Foundation (NSF)

7:10 p.m. Briefings from NSF, DARPA and DOE  
(10 minutes each) with Q&A after each presentation

NSF's Response to the Nanotechnology Signature Initiatives  
Getting Funded through the DOE's Office of Basic Energy Sciences  
How DARPA Evolves

7:45 p.m. Panel Discussion across the Agencies (in turn a response will be provided from each agency)



## ***Office of Special Programs (OSP) within DMR\****

*OSP coordinates & supports crosscutting activities in  
Division of Materials Research &  
in conjunction with NSF-wide programs  
in areas of strategic interest to NSF*

- Established in 2002
- Intellectual scope cuts across DMR research themes
- OSP efforts so far emphasize sustainable international cooperation, education, and workforce diversity
- Coordinates with DMR management and other DMR programs to fund the activities it supports
- Co-funds heavily with other NSF units (OISE, OMA, EPSCoR, ENG, PHY, CHE), DoD, & *with foreign research funding organizations*

*\*slides from Dr. Carmen Huber with slight modifications*

# *A Vision for a Global Materials Network*

- Connects diverse stakeholders (people, academic institutions, professional societies, government agencies, etc.) interested in materials research and education
- Based on joint ownership, mutual benefit, and universal participation
- Its mission is to serve the needs of materials stakeholders worldwide



*Microstructured Optical Fibers as High Pressure Microfluidic Reactors, P. Sazio (UK), J. Badding (Penn State) et al, Science, March 2006*

**“Over the past decade, the Materials World Network has reached out to nearly every region of the globe. *To my knowledge, there is no comparable effort to encourage a genuinely integrated world community in any other field of science and engineering.***

Dr. A. Bement, NSF Director, at MWN: The Next Ten Years, Cancun, Mexico, August, 2005

# *International Collaborations in Materials Research (Materials World Network)*

- Partners with, *and leverages resources of*, 40+ research funding organizations worldwide
- Incorporates the concept of 'foreign co-PIs'
- Provides long-term, sustained support for collaboration among the best talent in materials research - regardless of its location
- Develops workforce technically competent and skilled at multidisciplinary and multi-cultural collaborations
- Integrated with DMR programs; OSP plays a coordinating role

## **MWN FY 2010 competition:**

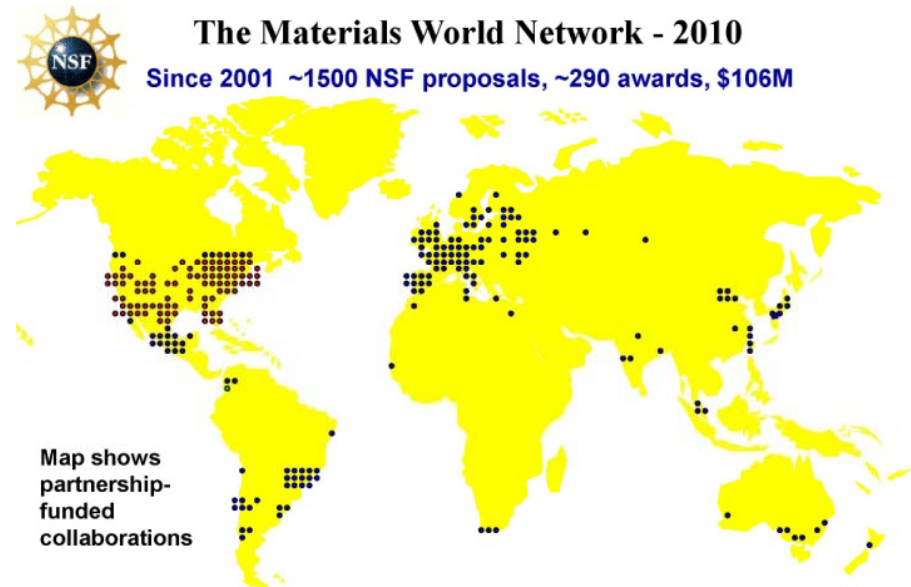
255 Proposal Received

187 Proposals Reviewed

37 Proposals Funded

FY10 funds: \$2.9 M OSP / \$2.9M

other DMR/ \$0.5M OISE

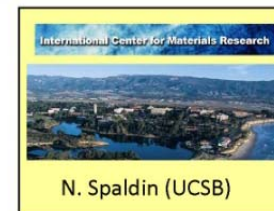
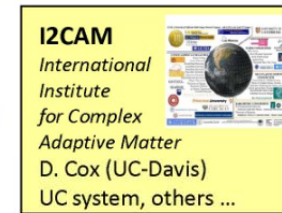
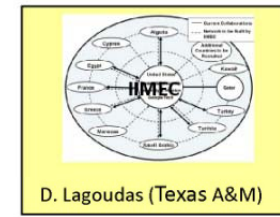


~ 180 proposals and 35 awards annually @ ~\$14M/yr from NSF



# International Materials Institutes (IMI)

- Enhance and coordinate international cooperation in materials
- International research and education experiences for US-based students
- Seed research collaborations, workshops, exchange programs, summer schools, fellowships, etc.
- Evolve into US nodes of a worldwide materials network
- 3 established in FY03, 3 in FY04
- Average annual total \$4.0M (incl. 0.25M OISE, PHY)
- Funded for 5 years, site visit review in year
- Open recompetition in FY09



Participants Annual Total	Total	Female	UR Minority	Travel Abroad
Faculty	516	51	20	44
Postdocs	153	46	6	75
GSs	405	100	5	106
UGs	93	26	12	

Note: Data on Gender/Ethnicity of student/postdoc workshop attendees is not always available

**IMI FY09:**  
 45 Proposals Reviewed  
 3 IMIs Renewed  
 2 New : Texas A&M and NWU  
 FY09 funds: \$11.7 M (inc. \$7.9 ARRA)

# *A Global Materials Network: are we there yet?*

- A materials network that links all talent available, regardless of geographical location:
- DMR visits to Japan, China, Korea: moderate but stable participation of JSPS in MWN
- Increased MWN investment from NSF-China: 2 jointly sponsored workshops with NSF-China in 2008 & 2009; 3rd NSF-NSF China workshop for joint grantees & junior researchers in Apr. 2011
- DMR visit to East Africa: potential winter school
- IMIs evolve into US-based nodes of the network: evolution from emphasis on in-house research to “outward looking” or networking mode  
(right IMI size for viability & impact: several small Institutes vs. a few large ones)

# *A Global Materials Network: are we there yet?*

More and better utilization of  
cyber infrastructure in support  
and as a result of the network

Seamless flow of people,  
information, materials, etc.,  
through the network

International research  
experiences as an integral part of  
graduate students' education



*The Chicago-Chile Exchange: T. Witten (U. Chicago MRSEC), E. Cerda (U. de Santiago)*

# Ceramics Program in FY 2012

- CAREER proposals: *ad hoc mail review*, some already at NSF
- Unsolicited proposals & MWN in area of ceramics: *panels*
  - Panels usual in MWN
  - Panels every few years in CER (pre-2001, 2006, 2012...)
    - MWN submission or unsolicited DMR submission, not both!
    - 5 to 8 panels depending on # of submissions
    - **Volunteer panelists welcome!**  
(no pending unsolicited or MWN proposals as PI or co-PI)

# Merit Review in CER

- Business as usual: no changes to merit review anticipated before the spring of 2012
- Once new merit review is in place, it will affect NEW submissions; it will NOT be retroactive



The screenshot shows the National Science Board website. The header includes the NSF logo, the text "National Science Board GOVERNING BOARD OF THE NATIONAL SCIENCE FOUNDATION & POLICY ADVISORS TO THE PRESIDENT AND CONGRESS", and a search bar with "NSB Web Site" selected. A navigation menu lists: NSB HOME | MEMBERS | MEETINGS/EVENTS | COMMITTEES | NOTICES | HONORARY AWARDS | NSB PUBLICATIONS | NEWS. The "COMMITTEES" section is active, listing: Standing Committees, Executive Committee (EC), Committee on Audit & Oversight (A&O), Committee on Education and Human Resources (CEH), and Committee on Programs & Plans. The main content area is titled "Task Force on Merit Review (MR)" and has a "CHARGE" section. The charge text reads: "All National Science Foundation (NSF) proposals, as part of the Merit Review process, are evaluated with respect to two equally important Merit Review Criteria—Intellectual Merit and Broader Impacts. The two-criteria system was instituted in 1997, replacing a four-criteria system in place since 1981, in which reviewers had evaluated researcher performance competence, intrinsic merit of the research, utility or relevance of the research, and effect on the infrastructure of science and engineering. [more...](#)"

# Intellectual Merit (my input)

*All NSF projects should be of the highest intellectual merit with the potential to advance the frontiers of knowledge.* The goal of this review criterion is to assess the degree to which the proposed activities will advance the frontiers of knowledge. Elements to consider in the review are:

## Cutting-Edge

- What role does the proposed activity play in advancing knowledge and understanding within its own field or across different fields? To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts?

## Platform

- How well qualified is the individual or team to conduct the proposed research? Is there sufficient access to resources?

## Likelihood of Success

- How well conceived and organized is the proposed activity? (If appropriate, the reviewer will comment on the quality of prior work.)

## Moving Forward (assessment using reasonable metrics)

- How will the progression forward manifest (presentation, publication and data management; creation of intellectual property; technology transfer; diffusion and/or other)?

# National Goals (my input)

The purpose of the broader impacts criterion is to ensure the consideration of how the proposed project advances a national goal(s).

A broad set of important national goals include:

## Competiveness

- Increased economic competitiveness of the United States.

## Framework for Success

- Increased partnerships between academia and **other groups, particularly** industry. Enhanced infrastructure for research and education, including facilities, instrumentation, networks and partnerships.

## Communication

- Increased public scientific literacy and public engagement with science and technology.

## Workforce

- Development of a globally competitive STEM workforce. Increased participation of women, persons with disabilities, and underrepresented minorities in STEM. Improved pre-K–12 STEM education and teacher development. Improved undergraduate STEM education.

## Quality of Life

- Increased national security, **improved health, benefit to society and/or higher quality of life.**

**nature**news

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Published online 13 July 2011 | *Nature* **475**, 141 (2011) | doi:10.1038/475141a

Column: World View

## The dubious benefits of broader impact

Assessments of the wider value of research are unpopular. Proposed changes will only produce more hype and hypocrisy, says Daniel Sarewitz.

[Daniel Sarewitz](#)



Since 1997, it has not been sufficient for US researchers seeking grants from the National Science Foundation (NSF) to merely explain the intellectual merit of their proposal. They must also justify their work in terms of a variety of 'broader impacts'.

Politicians worldwide no longer accept that public investments in science automatically bring social benefits. They increasingly expect research expenditure to be justified on its potential contribution to social and economic goals. In the United States, this expectation has resulted in the NSF's notorious Criterion 2.

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better energy technology, more effective environmental management, reinvigorated manufacturing, reduced vulnerability to natural and technological hazards, reversal of urban-infrastructure decay or improved performance of the research system



# Broader Impacts (my input)

The purpose of this review criterion is to ensure the consideration of how the proposed project advances a national goal(s). Elements to consider in the review are:

National Goal/s

- Which national goal (or goals) is (or are) addressed in this proposal?

Preparation

- How well qualified is the individual, team, or institution to carry out the proposed broader impacts activities? Are there adequate resources available to the PI or institution to carry out the proposed activities?

Convincing

- Is there a well-reasoned plan for the proposed activities **and** a compelling description of how the project or the PI will advance that goal(s)?

Effectiveness

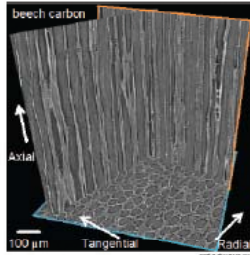
- Is the rationale for choosing the approach well-justified? Have any innovations been incorporated? **Is assessment or evaluation involved?** If appropriate, **has** department-level or institutional engagement **been included?**

# Interagency Meeting on Ceramics

- Topic varies from year-to-year: 2011 Scarce Minerals
  - <http://www.nsf.gov/mps/dmr/icccrd.jsp>
  - Day 1: agency reports
  - Day 2: experts on topic



## Advances in Ceramics through Government-Supported Research



Steve Fransen, Fransen Consulting; Lynnette D. Madson, National Science Foundation; and James W. McCauley, Army Research Lab

X-ray microtomograph of pyrolyzed carbon used to produce isotropic SiC. Image taken at Beamline 28M of the Advanced Photon Source of Argonne National Laboratory.



Since the 1970s, United States federal program managers involved in structural ceramics research and development have met annually as an interagency committee. In 2007, the name of this committee was changed to the Interagency Coordinating Committee on Ceramics Research and Development<sup>1</sup> to reflect the much broader nature of the research effort on ceramics throughout the government. Members of this committee represent numerous federal agencies and departments, including the Department of Defense (including all of the major services and the Defense Advanced Research Projects Agency), the Department of Energy, the National Aeronautics and Space Administration, the National Science Foundation and the National Institute of Standards and Technology<sup>2</sup>.

The primary function of this committee is to create a forum for communication and coordination among managers of federally-funded R&D programs in ceramics. The ICCCRD provides a mechanism for maximizing the effectiveness and resource sharing of government-supported research, helps prevent redundancy and supplies a forum for discussion of the U.S.'s global position. Unclassified work on ceramics has addressed the use of monolithic, composite and thin-film materials in various appli-

<sup>1</sup>Formerly known as the Interagency Coordinating Committee on Structural Ceramics (ICCCSC).  
<sup>2</sup>It is open to all federal agencies with an interest. Please contact Steve Fransen, [www.fransen@fransen.com](mailto:www.fransen@fransen.com) for more information.

Click to sh

## A perspective on materials databases

Stephen Fransen, Lynnette D. Madson and John Buehler

Improvements in measurement procedures; lack of materials specifications, especially with respect to ceramics; access to proprietary data on new materials; and the need for quality evaluation are the important issues involved in developing and maintaining materials property databases.



Recently, the U.S. National Science Foundation announced that all future proposals need data management plans. Although database additions may only cover one aspect of data management, the entire issue takes on increased importance for NSF grantees.

It is widely accepted that convenient access to reliable materials property data is vital to the development of innovative components and devices. These data are necessary for the design of new and complex multimaterial structures and for the development of hitherto unknown materials, as well as for combinations of