

MRS Update to the University Materials Council

Todd Osman

2015 MRS Spring Meeting

April 6, 2015

2014



Tia Benson Tolle
2014 MRS President



Todd M. Osman
MRS Executive Director

YEAR-END REVIEW

"Coming together is a beginning; Keeping together is progress; Working together is success." Those simple but powerful words from Henry Ford could well describe the success of our own Materials Research Society (MRS). While continuing to honor the vision of our founding members—who over 41 years ago opened the doors to interdisciplinary inquiry, professional partnerships and public appreciation for the role of materials in our lives—each year an inspired new roster of volunteers comes together to find exciting and innovative ways to shape the Society and chart its path forward. 2014 was no exception. Here we outline just a few special achievements of the past 12 months. Then turn the page and find a remarkable array of people, projects, places, premiers and previews that defined the year—by the numbers!

The **Materials Research Society Foundation** was established in late 2012 to advance the MRS mission of promoting interdisciplinary materials research and ensure that MRS programs in education outreach and peer recognition continue to grow. Two years later, the Foundation has funded member-proposed outreach projects, University Chapter Special Projects, free electronic memberships for students studying in developing countries, and experiment kits to connect U.S. and African materials scientists and university students. And thanks to a generous donation by the Jiang Family Foundation, a new award honoring excellence in post-doctoral research was presented at the 2014 MRS Fall Meeting. Additional information on the Foundation and its good works are outlined on the last page of this report.

In publication news, the MRS partnership with Cambridge University Press continues to produce innovative new products and services. Just launched, **MRS Energy & Sustainability—A Review Journal** focuses on key topics in materials research and development as they relate to energy and sustainability. We're also pleased to announce new Open Access options for select MRS publications, with discounted rates for our MRS members.

Continuing our focus on energy and sustainability, a pioneering new international traveling science exhibition, **Strange Matter Green Earth (SMGE)**, is in predevelopment and will be a major Society focus as we move into 2015. This interactive exhibition will enable millions of people across the globe to explore ways in which advances in materials can lead to a more sustainable future. SMGE is modeled after the first traveling

science exhibition from MRS—**Strange Matter**, a dynamic showcase of materials science now in its second decade of touring, with recent museum locations in the United Arab Emirates (Abu Dhabi) and China (Hong Kong and Shanghai). Strange Matter illuminated the power of a traveling science center exhibition and launched MRS as a leader in public education and outreach.

The **MRS OnDemand®** platform and the **MRS OnDemand Webinar Series** continued to grow in 2014 and will expand in 2015 with Webinar Wednesdays. This new series features free, live webinars and event rebroadcasts throughout the year that provide valuable educational information on timely, interdisciplinary topics, all while networking with other researchers from around the world.

Career Central was also introduced in 2014, with the goal of preparing and inspiring the talented and enthusiastic next generation of materials professionals. Offering a new online Job Board for job seekers and employers, and Career Fairs at MRS Spring and Fall Meetings that provide on-site job interviews, mentoring sessions with senior scientists, resume critiques, mock interviews, and professional development seminars and workshops, Career Central is a one-stop shop for all professional development needs.

That segues to yet another pioneering project from MRS designed to support and inspire **iMatSci—Innovation in Materials Science**. Added to the lineup of activities at the 2014 MRS Fall Meeting Technology Innovation Forum, iMatSci gathered educators, industry leaders, innovators and venture capitalists in one location to spur collaboration and accelerate the adoption of new materials technologies that deliver value in real-world applications. The program was successful beyond expectations and is one of the ways we are facilitating connections between materials researchers across sectors and around the world.

And as always, this is the perfect time for us to thank the over **1000 volunteers plus members, leadership, headquarters staff, vendors, advertisers, exhibitors, sponsors, host cities and the materials community** who make MRS "the world's leading scientific organization for researching, developing, and applying new and existing materials." These volunteers don't just share in our success, they contribute to our success, and for that we are extremely grateful.

Tia Benson Tolle, PhD
2014 MRS President

Todd M. Osman, PhD
MRS Executive Director

Outline

- MRS Membership
- Snapshot of some key MRS activities
 - MRS Advocacy
 - MRS Publications
 - Materials Research Society Foundation

MRS Membership

2014 Year End		U.S.	Non-U.S.
Total Members – 16,100		53%	47%
	<i>Benchmark: US-based Scientific Societies*</i>	71.1%	28.9%
	<i>Benchmark: US-based Engineering Societies*</i>	75.6%	24.4%
Meeting Members (Spring and Fall)	<i>67% of total</i>	51%	49%
Direct Members	<i>33% of total</i>	59%	41%

*- from McKinleyAdvisors

MRS Advocacy

Scientific Research

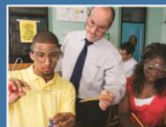
Research in science and engineering is the backbone of America's innovation economy. The federal investment in basic research in the physical sciences and engineering has strengthened national security, improved health care, advanced alternative energy and efficiency technologies, made possible the education of generations of scientists and engineers, and fueled economic growth and American jobs.



Economy/American Jobs Federal investment in scientific research pays huge dividends by boosting America's innovation capacity, strengthening our global competitiveness, and creating high-skill, high-wage jobs.



Education The investment in scientific research at America's universities and national labs not only produces new discoveries and ideas but also trains the next generation of scientists and engineers.



National Security Investments in scientific research lead to advanced technologies for equipping our modern forces and defending the nation, and for providing homeland threat detection capabilities.



Health Many advances in fighting disease are the result of cutting-edge technologies that come from federally funded research in the physical sciences and engineering at our universities and national laboratories.



Energy and Environment Developing alternative energy sources and improving energy efficiency require federal support of basic research. Discoveries will help reduce U.S. dependence on foreign oil as well as improve the environment.



The Task Force on American Innovation is an alliance of America's leading companies, research universities, and scientific societies. America's future relies on investment in ideas and discovery. We advocate for robust and sustained research

MRS Advocacy

Energy Critical Elements:

										2 He Helium 4.003	
		5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797				
		13 Al Aluminum 26.981538	14 Si Silicon 28.0855	15 P Phosphorus 30.973761	16 S Sulfur 32.066						
28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.92160	34 Se Selenium 78.96					
46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60					
78 Pt Platinum 195.078	79 Au Gold 196.96655	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98038	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]			
65 Tb Terbium 158.92534	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93032	68 Er Erbium 167.26	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967					



Deconstructing the iPad

How Federally Supported Research Leads to Game-Changing Innovation



Advanced Materials by Design
Accelerating new materials to market

Materials Matter!

From the synthetic fibers in Kevlar® vests to the lithium-based compounds that power mobile devices to the semiconductor materials used in flat panel TVs, advanced materials are a part of our everyday lives. Materials are critical for the well-being and advancement of society. The development of new materials—semiconductors, metals, plastics, ceramics, composites, nano-materials—is essential for continued growth of our economy, for national security and defense, and for a better quality of life.

A new material typically takes up to two decades to reach the marketplace from the laboratory. The widely used lithium-ion batteries in our portable electronic devices, for example, were first proposed in the mid-1970s but only achieved broad market adoption in the late 1990s. Teflon®, the non-stick coating material, took even longer. Invented in the late 1930s, it was not commercialized until the early 1960s.

A new paradigm that ties together innovative computation techniques, data usage, scientific knowledge and experiments in unique ways is finding resonance to cut the development time for new materials in half and to achieve this at a much lower cost.

This is a new era for the field of materials science and engineering!

MRS MATERIALS RESEARCH SOCIETY
Advancing materials. Improving the quality of life.

Securing Materials for Emerging Technologies

A REPORT BY THE APS PANEL ON PUBLIC AFFAIRS & THE MATERIALS RESEARCH SOCIETY



SPONSORS



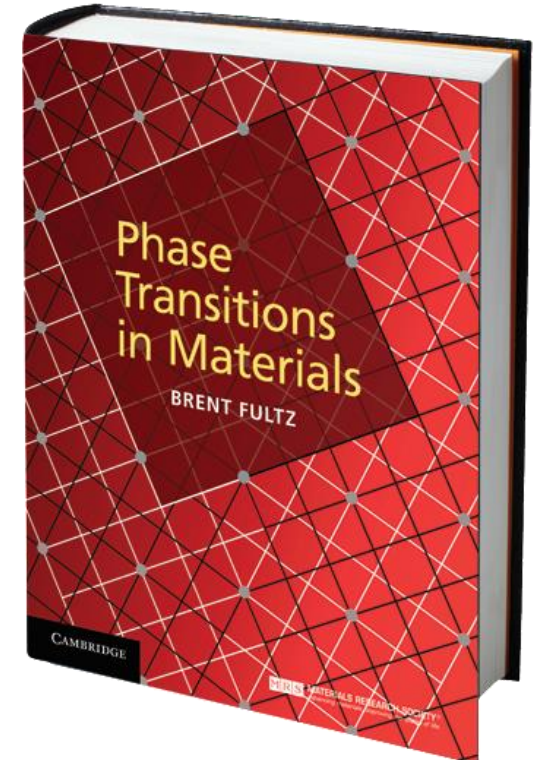
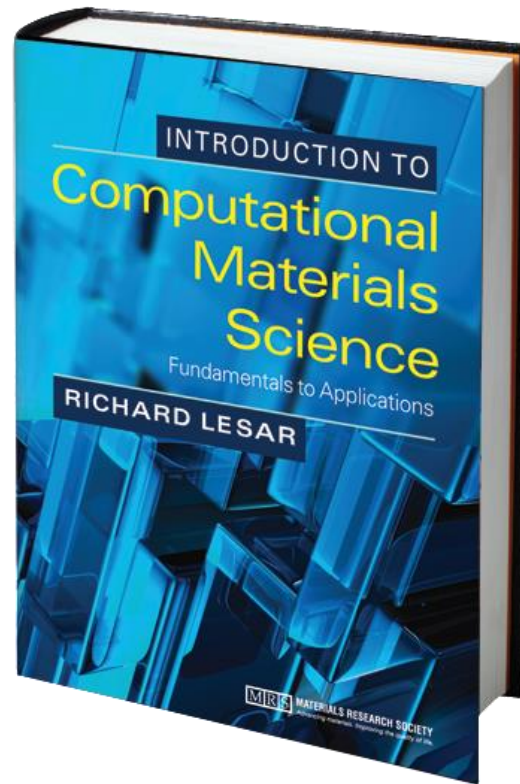
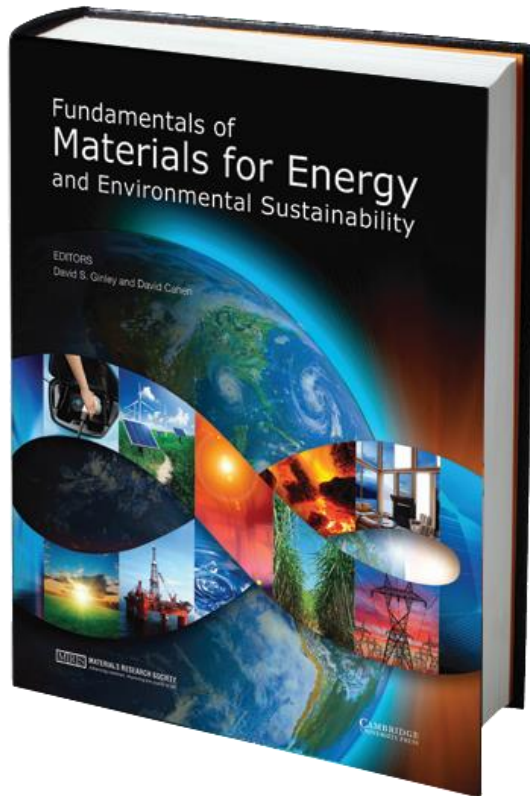


Damon Dozier
MRS Director of Government
Affairs
MRS Washington Office



Textbooks

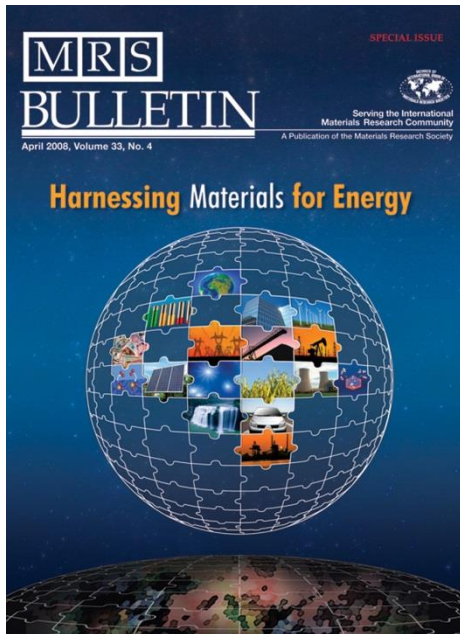
<http://www.mrs.org/books-textbooks/>



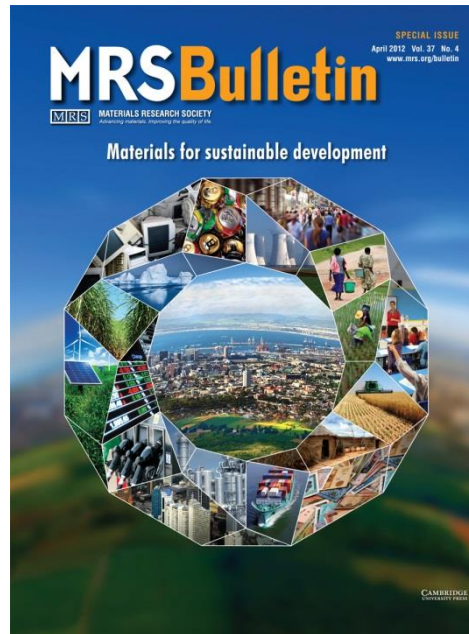
MRS Bulletin

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Advancing materials. Improving the quality of life.

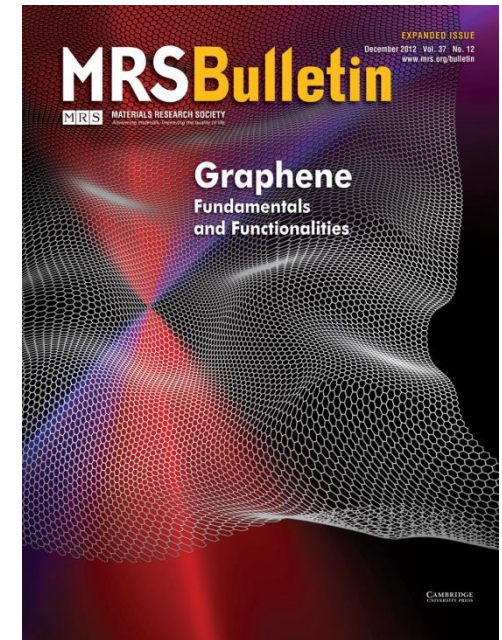
Special and Expanded Issues



**Harnessing
Materials for
Energy**
(April 2008)



**Materials for
Sustainable
Development**
(April 2012)



Graphene
(December 2012)

Materials & Engineering: Propelling Innovation

Special Issue - December 2015

- Guest Editors:
 - V.S. Arunachalam - CSTEP (Bangalore, India) and Carnegie Mellon University
 - Dipankar Banerjee - Indian Institute of Science
 - Jim Williams - Ohio State University
 - Y. T. Cheng - University of Kentucky
- Twenty articles covering
 - The relationship and interplay between materials and engineering
 - How engineering accentuates the properties of materials
 - How materials inspire innovations in engineering and technology
 - How materials engineering benefits society
- Special events at the 2015 MRS Fall Meeting and 2016 MRS Spring Meeting



MATERIALS RESEARCH SOCIETY FOUNDATION

Your donations support a wide range of innovative grassroots, member-driven initiatives—from student chapter proposals, to local or regional education/outreach projects, to those with the potential to impact the materials enterprise worldwide.



Contributing to the SciBridge, connecting African university students to U.S. materials scientists



Bringing hands-on science lessons to rural schools in the state of Tennessee through the Materials Outreach for Rural Education (MORE) program



Establishing new peer-recognition programs such as the MRS Postdoctoral Awards, which honored its first two recipients at the 2014 MRS Fall Meeting



Supporting Nanomaterials for Middle School Students, a project providing middle school science teachers with curriculum content, supply kits and instruction on how to engage in nanomaterial learning activities with their students



Expanding the MRS University Chapter Program globally, now with 90 Chapters worldwide

Make the most of your giving.

By partnering with the Materials Research Society Foundation, you make the biggest impact possible.

www.mrs.org/foundation

MRS MATERIALS RESEARCH SOCIETY®
Advancing materials. Improving the quality of life.

MISSION: An organization of materials researchers worldwide that promotes communication for the advancement of interdisciplinary materials research and technology to improve the quality of life.

VISION: Will build a dynamic, interactive, global community of materials researchers to advance technical excellence by providing a framework in which the materials disciplines can convene, collaborate, integrate and advocate.



Grassroots, Member-Proposed Grants

2013

- East Boston High School (EBHS) Materials Science Program
- Nanomaterials for Middle School Students
- Materials Outreach for Rural Education (MORE)

2014

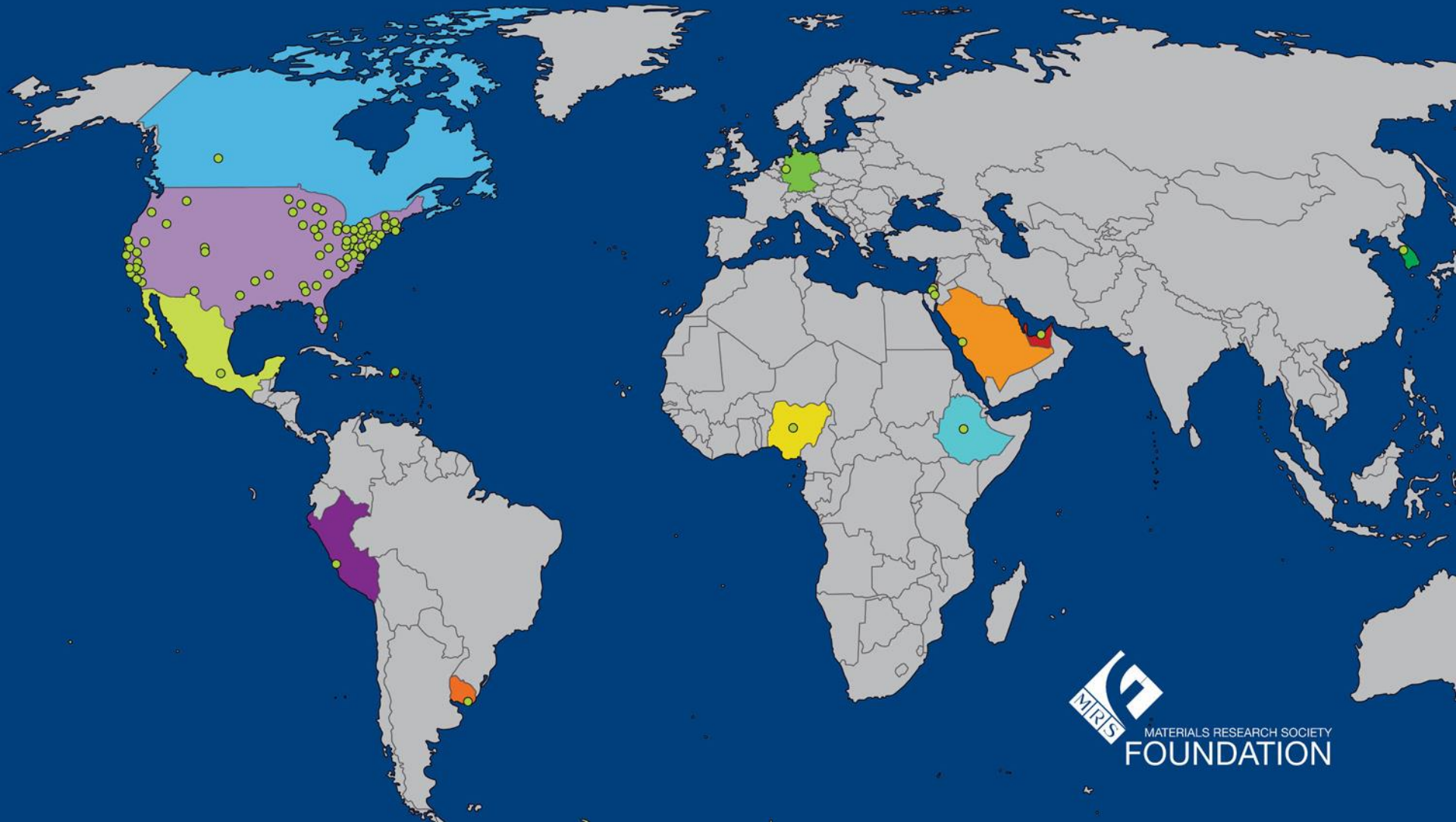
- Building the SciBridge between Africa and the U.S.
- Fostering Environmental Consciousness in Classrooms through Sustainable Materials and Biopolymers
- Integrating Art and Materials Science: A Workshop for K-12 Teachers
- Science Saturdays
- SMART PUPPY

2015

- Recipients announced at 2015 MRS Spring Meeting

Materials Research Society®

University Chapters





Impact of Materials on Society (IMOS)

- Collaboration
 - MRS Public Outreach Committee's IMOS Subcommittee
 - University of Florida
- General Education Course
 - Undergraduate Students
 - Community Colleges
 - Awareness of materials science and engineering
 - Recruiting students to study materials science and engineering





strange MATTER



Drôle de MATHIÈRE

MATERIA Extraña



ABU DHABI
SCIENCE FESTIVAL
Abu Dhabi Science Festival
Nov. 14, 2013 - Nov. 23, 2013
Corniche Abu Dhabi, AE

Experience Strange Matter Exhibition!

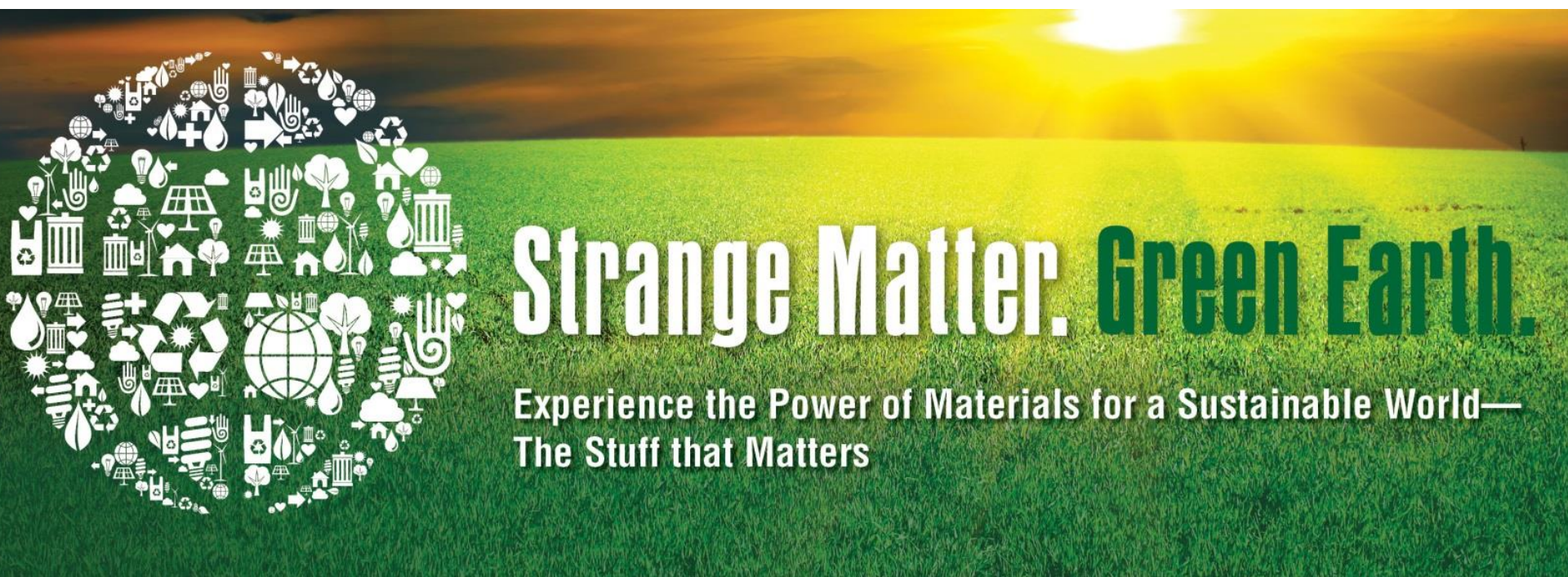
神奇物質 strange MATTER

材料科學展

2015



Next generation of international traveling materials science exhibitions



Strange Matter. **Green Earth.**

Experience the Power of Materials for a Sustainable World—
The Stuff that Matters



diversity

The Materials Research Society recognizes that diversity drives innovation, excellence and new discoveries. We charge our membership and leadership to engage all demographic groups worldwide in advancing science and technology to improve the quality of life.



Recent MRS Foundation Activities



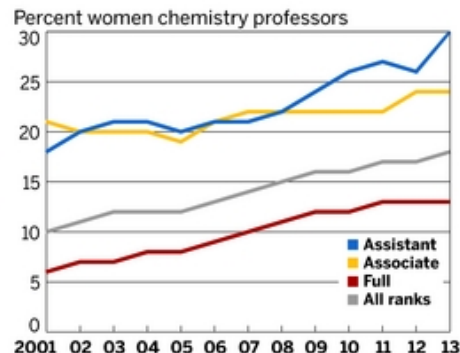
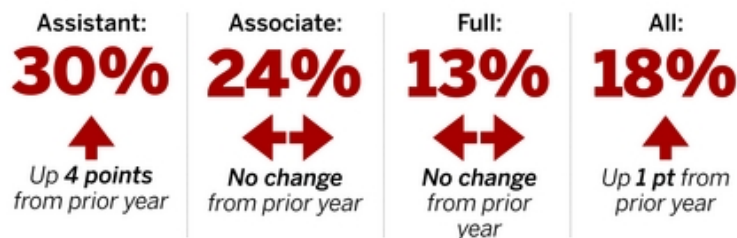
- Diversity Subcommittee and Women in Materials Science & Engineering Subcommittee Programs
 - 2013 and 2014 MRS Fall Meeting programs for students from URM institutions
 - MRS Mentoring Program
 - Workshops at the MRS Spring and Fall Meetings
 - Networking Events at the MRS Spring and Fall Meetings
 - Newsletter and Website
- Sponsor for NSF/UMC Diversity in MSE Workshop
- Free student membership for developing country institutions



An invitation to UMC

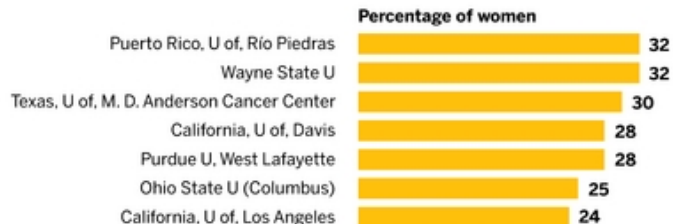
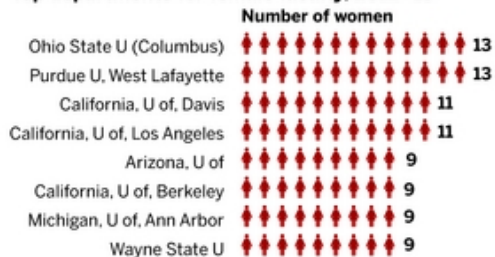
UPTICK Over the past decade, women's share of chemistry professorships at top universities climbed from 12% to 18%.

PERCENTAGE OF WOMEN CHEMISTRY PROFESSORS, 2012-13

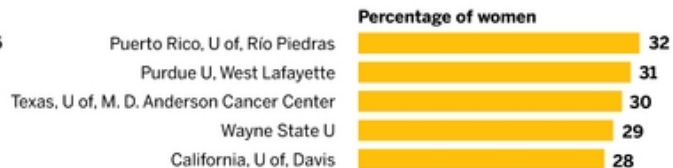
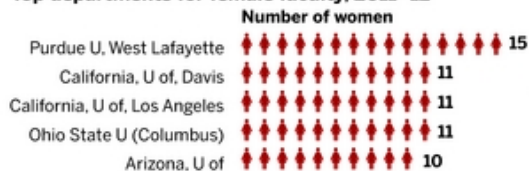


TOP DEPARTMENTS Among big spenders on chemistry R&D, these schools' chemistry departments had the most women or highest percentage of women.

Top departments for female faculty, 2012-13



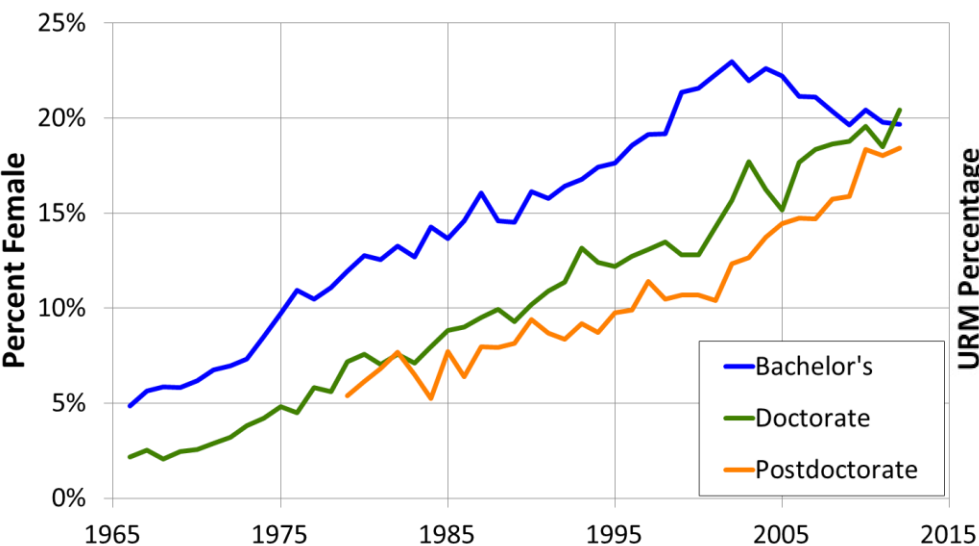
Top departments for female faculty, 2011-12



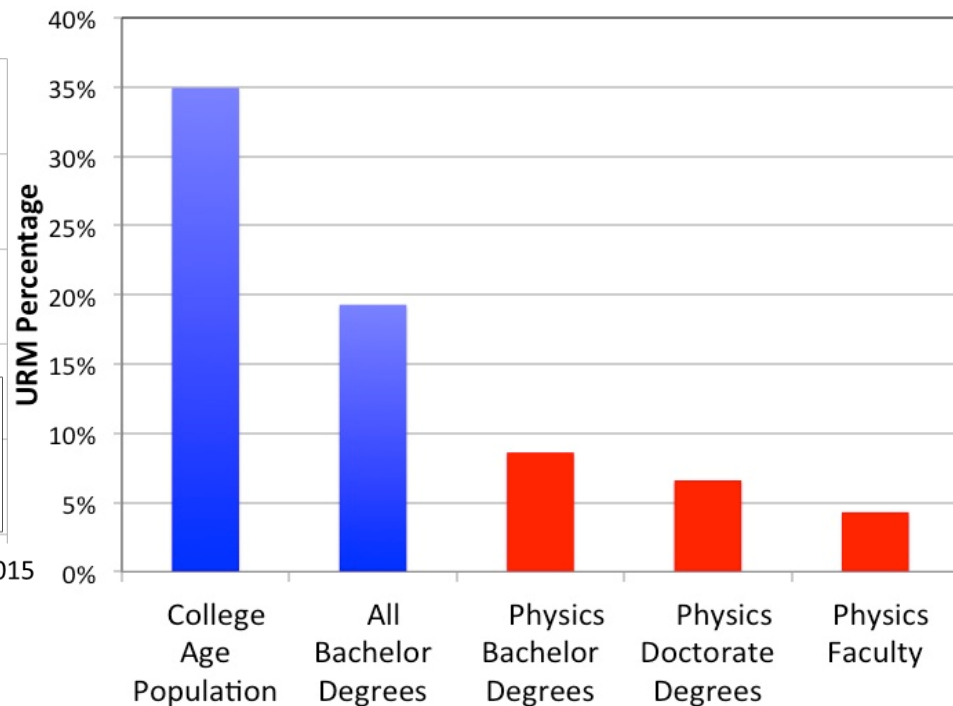
NOTE: Tenured and tenure-track women chemistry faculty at the 75 schools identified by the National Science Foundation as having spent the most on chemistry research in fiscal-year 2010. **SOURCES:** C&EN and OXIDE surveys

C&EN, April 7, 2014 pp. 41-44

Women in Physics



Percentage of Under-Represented Minorities in Physics



REPORTS

[Reports](#) | [Newsletters](#)

- [Presentations and other information from the Materials Information Luncheon co-sponsored by UMC, Feb. 15, 2012, Washington, DC](#)
- [Report of Materials Genome Initiative Strategic Scoping Session \(MS&T, Columbus 2011\) \[pdf\]](#)
- [UMC Letter of support for the President's Materials Genome Initiative \[pdf\]](#)
- [UMC Annual Report for 2010-2011 academic year \[pdf\]](#)
- [Banerjee and Briber's analysis of MSE faculty backgrounds \[pdf\]](#)
- [Materials Genome Initiative White Paper \[pdf\]](#)
- [UMC presentation to the First International Conference on ICME, 07/13/11 \[pdf\]](#)
- [2010 Benchmarking Survey \[pdf\]](#)
- [Memorandum of understanding between UMC and TMS \[pdf\]](#)
- [Why so few? AAUW report on Women in Science, Technology, Engineering, and Mathematics \[pdf\]](#)
- [2009 Benchmarking survey \[pdf\]](#)
- [Memorandum of Understanding Between the UMC and the MRS \[pdf\]](#)
- [UECC letter of intent \[pdf\]](#)
- [UECC Minutes, 3/29/10 \[pdf\]](#)
- [National Academies Report on MSE in 1990: Materials Science and Engineering for the 1990s: Maintaining Competitiveness in the Age of Mater](#)
- [M. C. Flemings, "WHAT NEXT FOR DEPARTMENTS OF MATERIALS SCIENCE AND ENGINEERING?," Annu. Rev. Mater. Sci. 1999, 29:1-23](#)
- [National Academies Report: Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty](#)
- [Briefing Slide on NAS Gender report, June 2, 2009 \[pdf\]](#)
- [Perspective on Gender, culture, and mathematics performance by J.S. Hydea and J.E. Mertz \[pdf\]](#)
- [2008 Benchmarking Survey \[pdf\]](#)
- [Implementation of Tiered Objectives for ABET Assessment in an Engineering Program, by E.B. Slamovich and K.J. Bowman \[pdf\]](#)
- [UMC White Paper on Design Interpretation of ABET Criteria \[pdf\]](#)
- [Materials Advocacy Summit Report, 2009 \[pdf\]](#)
- [Gender Equity Workshop Report, 2008 \[pdf\]](#)
- [Status and Evolution of Accreditation for Materials Programs in the U.S \[pdf\]](#)
- [A recent NRC Report: Integrated Computational Materials Engineering: A Transformational Discipline for Improved Competitiveness and National Security](#)
- [2007 Benchmarking Survey \[pdf\]](#)
- [2004 Benchmarking Survey \[pdf\]](#)
- [2001 Benchmarking Survey \(revised\) \[pdf\]](#)
- [Fall 2000 Meeting--MSE 660 Atomistic Modeling of Materials \[pdf\]](#)
- [TA Stipend Survey 1999 \[image\]](#)
- [1996-97 Graduate Student Survey Results](#)

An invitation to UMC to annually publish data on Diversity in MS&E in

MRS Bulletin

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