

2016

MATERIALS RESEARCH SOCIETY YEAR-END REVIEW



Kristi S. Anseth, PhD
2016 MRS President



Todd M. Osman, PhD
MRS Executive Director

The Materials Research Society 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.

That is the Materials Research Society (MRS) Vision Statement. As we reflect on 2016 and its accomplishments, it is obvious that those responsible—the MRS volunteers and staff who develop and deliver our broad spectrum of programs and services—have been guided by that Vision and the Core Values that underpin it.

CORE VALUE—Promoting technical excellence

MRS has long been known for its exceptional meetings, serving as a major international stage for the examination of current and emerging research, and 2016 was no exception. In March, the MRS Spring Meeting moved to its new home in Phoenix, Arizona, attracting researchers from all scientific fields, backgrounds and employment sectors—students to Nobel Laureates—to exchange technical information, network with friends and colleagues, and contribute to the advancement of materials research. It was a new city and a new venue, but the “great meetings society” tradition endured.

CORE VALUE—Being visionary and dynamic

MRS continues to explore ways to better engage and equip the next generation of materials researchers. Through our continuum of broader impacts programming and professional development sessions, our growing graduate student and postdoctoral awards, the University Chapters Program that is now international in scope and so much more, MRS is dedicated to preparing students for future professional and leadership roles in the global materials community. In addition, initiatives like iMatSci—Innovation in Materials Science are providing our scientific innovators an opportunity to convene with industry leaders and investors to demonstrate the practical applications of their pioneering research and technologies.

CORE VALUE—Being interdisciplinary

2016 was a busy year for MRS publications, which provide the R&D community with a vast collection of high-quality information on critical, cutting-edge materials research. The inaugural *MRS Communications* Lecture was presented by David C. Martin, University of Delaware, at the MRS Spring Meeting. *MRS Bulletin*, our flagship publication, introduced its new digital platform, with expanded features that include the latest materials news and policy issues, career opportunities, multimedia functionality, building social media feeds and more. *MRS Advances*, the most recent MRS journal, named David F. Bahr as its first Editor-in-Chief. And in September, the Society launched its new website, with enhanced search and user-centric navigation.

CORE VALUE—Being broadly inclusive and egalitarian

Since its inception, the Materials Research Society Foundation has encouraged and funded member-proposed projects that promote diversity and inclusion within the broad materials community and that help support and encourage those who are currently underrepresented in materials science and engineering. In 2016, the Foundation funded six grassroots outreach projects serving three countries—Kenya, India and the United States—as well as 10 University Chapter Special Projects. In addition, it funded discounted electronic memberships for those working or studying in developing countries, and launched the MRS Impact Award, which honors outstanding individuals who have displayed excellence in areas of science communications, education, advancing diversity, mentoring or community engagement, and more.

Of course, this is all just a small sampling of the valuable and inspiring accomplishments that MRS and our volunteers have realized over this past year. And yet, we know we can do more. Our Society is a collection of materials researchers—diverse, global, talented, technically exceptional, trailblazing—and we want to partner with you to build new initiatives and programs. The MRS Board of Directors has just begun strategic planning, looking at the scope of our activities to assess where we are as a Society and how we can better position ourselves to serve the materials community in the future. Whether you are a junior or senior researcher, have a large or small amount of time to dedicate, or are a new or lifetime member, we value and seek your input into the process. Please help. Get involved. Join us as we chart the future direction of MRS!

Kristi S. Anseth, PhD **Todd M. Osman, PhD**
2016 MRS President MRS Executive Director

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

2016 BY THE NUMBERS

Looking back on 2016, we are delighted to see all the **Materials Research Society** has accomplished. Our members, volunteers, exhibitors, sponsors, partners and headquarters staff are all to thank for the tremendous success of our Society. We are pleased to present this year-end review, outlining some of our biggest achievements of the past year ... by the numbers!

SOCIETY

- ▶ broadened the reach of the Society's mission with the help of over **1000** volunteers from across the globe
- ▶ served an MRS membership of almost **15,000** students and professionals hailing from physics, chemistry, biology, mathematics and engineering—the full spectrum of materials science
- ▶ furthered our global engagement by representing women and men from **90** countries around the world in our membership and meetings
- ▶ added **6** new MRS University Chapters, bringing the current total to **108**, with **18%** of the Chapters located outside of the United States
- ▶ increased MRS Corporate Partners to **20**, strengthening support of the Materials Research Society Foundation and its programs
- ▶ announced **6** Materials Research Society Foundation grants and **10** University Chapter Special Project Awards at the 2016 MRS Spring Meeting
- ▶ honored **80** MRS Members through the MRS Awards Program
- ▶ advanced **1 MISSION**—to promote communication for the advancement of interdisciplinary materials research and technology to improve the quality of life

WEB & SOCIAL MEDIA

- ▶ garnered **3.4 MILLION** page views on the MRS website
- ▶ increased traffic by **28%** after the new mobile-responsive website launched in September
- ▶ strengthened MRS presence on social media, generating over **32,000** followers on Facebook, Twitter and LinkedIn
- ▶ recorded **41** interviews with materials science experts via MRS TV during the 2016 MRS Spring and Fall Meetings, accruing almost **14,000** views on the MRS Meeting playlist
- ▶ expanded the MRS OnDemand® Webinar Series with **19** live webinars throughout the year, providing valuable education information to participants from **50** countries

PUBLICATIONS

- ▶ reported over **890,000** full-text downloads across all MRS Journals hosted on Cambridge Journals Online and the new Cambridge Core
- ▶ ranked in the top **10%** of materials science journals with *MRS Bulletin*, and increased Impact Factor to **6.06**
- ▶ delivered **8%** more published content to members and institutional subscribers via *Journal of Materials Research (JMR)* over prior year
- ▶ published **63** issues, including **601** papers and **3808** pages, in *MRS Advances*' first year
- ▶ received **20%** more submissions to *MRS Communications* from 2015 to 2016 than previous two-year period
- ▶ increased full-text downloads of *MRS Energy & Sustainability—A Review Journal* by **158%** over 2015
- ▶ achieved **2.7 MILLION** abstract views on the *MRS Online Proceedings Library Archive*
- ▶ extended the breadth and scope of the MRS Book Collection, now with **15** books and textbooks in the portfolio
- ▶ shared **5659** articles on social media and over **2000** via blog posts
- ▶ published almost **400** news stories in 2016, announcing the latest breakthroughs in materials science
- ▶ reported a readership of over **60,000** for the *Materials360*® e-newsletter, now in its **16th** year of publication



MEETINGS & WORKSHOPS

- ▶ held our **1ST** MRS Spring Meeting in Phoenix, Arizona
- ▶ offered **116** topical symposia at the 2016 MRS Spring and Fall Meetings, bringing in over **12,000** total on-site attendees
- ▶ processed over **10,000** 2016 MRS Spring and Fall Meeting materials research papers
- ▶ served almost **7000** attendees via the 2016 Spring and Fall Meeting App
- ▶ hosted a record-breaking **31** Innovation in Materials Science (iMatSci) teams at the 2016 MRS Fall Meeting, all presenting their innovative and emerging technologies
- ▶ featured **390** international exhibitors with the latest techniques and advances in materials research at the 2016 MRS Spring and Fall Meetings
- ▶ served **900** job seekers through the 2016 MRS Spring and Fall Meeting Career Fairs and attracted almost **150,000** views on the MRS Job Board
- ▶ garnered **1718** attendees at the XXV International Materials Research Congress (IMRC), held in partnership with the Sociedad Mexicana de Materiales (SMM)
- ▶ hosted more than **2500** scientists and **74** exhibitors at **6** conferences and workshops managed through the MRS Conference Services Program

PUBLIC OUTREACH & ADVOCACY

- ▶ continued to bring materials research to the public via the international traveling exhibit, Strange Matter, reaching over **5.3 MILLION** exhibition attendees on **3** continents in its **13TH** year
- ▶ received the first **\$500,000** sponsor payment for the new traveling science exhibit initiative, Strange Matter Green Earth, which will enable millions to explore ways in which advances in materials can lead to a more sustainable future
- ▶ sent a record-breaking number of **4698** letters to U.S. Congress through the MRS Materials Voice platform
- ▶ provided balanced coverage of science policy news in *MRS Bulletin*, *Materials360 Online*, and social media, with **53%** international (non-U.S.) stories
- ▶ released **10** instructional modules and conducted **2** implementation workshops for Impact of Materials on Society, an undergraduate course that, in partnership with the University of Florida, studies the interrelationships between society and materials science

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MATERIALS RESEARCH SOCIETY FOUNDATION

2016 ACCOMPLISHMENTS

Supporting projects and initiatives created by the materials community, for the materials community, the Materials Research Society Foundation advances the MRS mission to “promote communication for the advancement of interdisciplinary materials research and technology to improve the quality of life.”

In 2016, the Foundation funded six exciting grassroots outreach projects that spanned the globe:

▶ **Chemistry on Computers in Kenya (CCK)**

New York University Abu Dhabi and Nelson Mandela African Institute of Science and Technology

The goal of CCK is to develop computer-based curriculums for secondary school labs that incorporate modeling, simulation, visualization and virtual experiments into the chemistry classroom—all focused on relevant scientific topics such as solar panels and clean water.

▶ **Promoting Interests in Energy Researches: Developing a Low-Cost Potentiostat for African Universities as a Teaching Tool**

The Pennsylvania State University

This project team has developed a low-cost, versatile potentiostat and five introductory experiments that introduce fundamental electroanalytical techniques suitable for beginning materials scientists. Through Foundation funding, these potentiostats and related experiments will be sent to 10 African universities.

▶ **Melter for Establishment of a Student-Run Hot Glass Shop**

Colorado School of Mines

Foundation funding will allow the university to add a hot glass shop for students to blow and work hot glass, providing an artistic outlet and introducing them, and the general public alike, to the history, importance and promise of the materials discipline.

▶ **What materials do for our world? Increasing awareness of materials science among traditionally underrepresented minority college and school students, and school teachers in New York City**

New York City College of Technology of the City University of New York

Faculty members will provide an unprecedented opportunity for NYC college and high school students, especially those traditionally underrepresented in science, technology, math and engineering (STEM), and their teachers, to become aware of the contemporary materials science advancements and to actively participate in materials science projects.

▶ **Vision India: GenY Applied Sciences Network**

University of Cambridge

This outreach program will assess the needs of students in various rural and urban settings in India and introduce them to the wonderful world of scientific research across a breadth of disciplines.

▶ **The Wonderful World of Materials—Afterschool Care Enrichment**

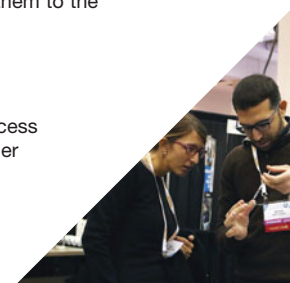
Johns Hopkins University

Through this unique afterschool program, students from underrepresented, low-income households, or with limited access to extra science activities, will be inspired to explore the wonderful world of materials around them and perhaps further their studies in materials science and engineering.

Additionally, in 2016 the Foundation:

- ▶ funded 10 MRS University Chapter Special Projects
- ▶ expanded diversity and inclusion initiatives
- ▶ supported 108 MRS University Chapters around the world
- ▶ honored outstanding contributors to the progress of materials research through 12 MRS awards
- ▶ funded discounted electronic MRS Memberships for those working or studying in developing countries
- ▶ offered professional and career development programs
- ▶ provided postdoctoral support

Looking toward 2017, we know that with your help, we can do more. Donate to the causes you care about. Visit www.mrs.org/foundation to learn more about the good work the Foundation is doing.





2017 **MRS**® FALL MEETING & EXHIBIT
November 26–December 1, 2017 | **Boston, Massachusetts**

CALL FOR PAPERS

Abstract Submission Opens
May 15, 2017

Abstract Submission Deadline
June 15, 2017

BROADER IMPACT

- BI1 Community College and University Partnerships as Catalysts for Promoting Materials Science Education
- BI2 Materials Innovation for Sustainable Agriculture and Energy

BIOMATERIALS AND SOFT MATERIALS

- BM1 Multiscale Mechanobiology and Biomechanics—Theory, Experiments, Computations
- BM2 Multiphase Fluids for Materials Science—Droplets, Bubbles and Emulsions
- BM3 Biological and Bioinspired Materials for Photonics and Electronics—From Living Organisms to Devices
- BM4 Biomaterials for Regenerative Engineering
- BM5 Polymer Gels in Materials Science—3D/4D Printing, Fundamentals and Applications
- BM6 2D Nanomaterials in Health Care
- BM7 Emerging Materials and Devices for Engineering Biological Function and Dynamics
- BM8 Materials Design for Neural Interfaces
- BM9 Stretchable Bioelectronics—From Sensor Skins to Implants and Soft Robots
- BM10 Bioinspired Interfacial Materials with Superwettability
- BM11 Modeling, Characterization, Fabrication and Applications of Advanced Biopolymers—Where Form Meets Function
- BM12 Biomolecular Self-Assembly for Materials Design

ELECTRONICS, MAGNETICS AND PHOTONICS

- EM1 Organic Semiconductors—Surface, Interface, Bulk Doping and Charge Transport
- EM2 Multiferroics and Magnetolectrics
- EM3 Novel Materials and Architectures for Plasmonics—From the Ultraviolet to the Terahertz
- EM4 Wide- and Ultra-Wide-Bandgap Materials and Devices
- EM5 Oxide Interfaces—Lattice and Electronic Defect Interactions
- EM6 Diamond Electronics, Sensors and Biotechnology—Fundamentals to Applications
- EM7 Materials, Devices and Architectures for Neuromorphic Engineering and Brain-Inspired Computing
- EM8 Emerging Materials for Quantum Information
- EM9 Electronic and Ionic Dynamics at Solid-Liquid Interfaces
- EM10 Solution-Processed Inorganics for Electronic and Photonic Device Applications

ENERGY AND SUSTAINABILITY

- ES1 Perovskite Materials and Devices—Progress and Challenges
- ES2 On the Way to Sustainable Solar Fuels—New Concepts, Materials and System Integration
- ES3 Earth Abundant Metal Oxides, Sulphides and Selenides for Energy Systems and Devices
- ES4 Interfaces in Electrochemical Energy Storage
- ES5 Materials and Design for Resilient Energy Storage
- ES6 Alkali Solid Electrolytes and Solid-State Batteries
- ES7 Chromogenic Materials and Devices
- ES8 Advanced Nuclear Materials—Design, Development and Deployment
- ES9 Thermal Energy—Transfer, Conversion and Storage
- ES10 Materials Efficiency to Enable a Circular Materials Economy
- ES11 Silicon for Photovoltaics

NANOMATERIALS

- NM1 Carbon Quantum Dots—Emerging Science and Technology
- NM2 Anisotropic Carbon Nanomaterials—Frontiers in Basic and Applied Research
- NM3 Progress in Developing and Applications of Functional One-Dimensional Nanostructures
- NM4 Atomically Thin, Layered and 2D Non-Carbon Materials and Systems
- NM5 Nanomaterials, Nanoparticles and Nanostructures Produced by Plasmas—Synthesis, Characterization and Applications
- NM6 Semiconductor Nanocrystals, Plasmonic Nanoparticles and Metal-Hybrid Structures
- NM7 Nanostructure-Based Optical Bioprobes—Advances, Trends and Challenges in Optical and Multimodal Bioimaging and Sensing
- NM8 Defect-Induced Phenomena and New States of Matter at the Nanoscale

PROCESSING AND MANUFACTURING

- PM1 Explore New Frontiers in Materials Design Using Plasmas—Synthesis, Processing and Characterization
- PM2 Advances and Upcoming Research Strategies in Reactive Materials
- PM3 Interfaces and Interface Engineering in Inorganic Materials
- PM4 Micro-Assembly Technologies—Fundamentals to Applications

THEORY, CHARACTERIZATION AND MODELING

- TC1 Multifunctional and Multifrequency Scanning Probe Microscopy
- TC2 *In Situ* Studies of Materials Transformations
- TC3 Emerging Prospect and Capabilities in Ion Beam Technology and Applications
- TC4 Advanced Atomistic Algorithms in Materials Science
- TC5 Uncertainty Quantification in Multiscale Materials Simulation
- TC6 Mechanical Behavior at the Micro and Nanoscale—Bridging Between Computer Simulations and Experiments
- TC7 Design, Control and Advanced Characterization of Functional Defects in Materials

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www.mrs.org/fall2017

2017 iMatSci Innovator Showcase
CALL FOR EARLY-STAGE STARTUPS
Submission Site Opens: June 1, 2017

www.mrs.org/imatsci

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506 Keystone Drive • Warrendale, PA 15086-7573
Tel 724.779.3003 • Fax 724.779.8313
info@mrs.org • www.mrs.org

Submission Deadline—June 1, 2017



Early Career Scholars in Materials Science 2018

**The third annual *JMR* Issue to promote outstanding research
by future leaders in materials science**

This third special issue invites full length research and review articles by materials researchers, who have completed their Ph.D but not yet achieved the level of full professor or senior scientist at the time of submission, for peer review and publication in the January 2018 issue. Ph.D students are not eligible to submit. The Annual Issue provides a unique opportunity to be highlighted and promoted early in one's research career. To increase attention to these papers, this issue will be published on an **open access** basis. Although some papers may have multiple authors, only the Early Career Scholar submitting the paper will be identified with a photo and brief bio when the paper is published. Authors from around the world are invited to submit papers that span the topical coverage of *JMR* including advanced ceramics, metals, polymers, composites, and combinations thereof related to energy, electrical, magnetic, optical, and structural properties and related applications, and reporting on:

- ◆ Advanced characterization methods and techniques
- ◆ Computational materials science when coupled with experimentation
- ◆ Fundamental materials science
- ◆ Interfacial science as relates to material process understanding and improvements
- ◆ Material property enhancements through advances in materials processing
- ◆ Material property enhancements through material design (especially Materials Genome-related)
- ◆ Material combinations and design that improve system performance
- ◆ Nanoscience and nanotechnology

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To be considered for the issue, the Early Career Scholar must not yet be a full professor at the time of submission. Also, the manuscript must report new and previously unpublished results. Review articles are invited but must be approved by the issue editors before submission (see www.mrs.org/jmr-manuscript-types/ regarding review articles). Manuscripts must be submitted via the *JMR* electronic submission system by **June 1, 2017**. Manuscripts submitted after this deadline will not be considered for the issue due to time constraints on the review process. Submission instructions can be found at www.mrs.org/jmr-instructions. Please select "ANNUAL ISSUE: 2018 *Early Career Scholars in Materials Science*" as the manuscript type. **Note our manuscript submission minimum length of 6000 words, with a maximum of 6–8 figures.** All manuscripts will be reviewed in a normal but expedited fashion. Papers submitted by the deadline and subsequently accepted will be published in the Special Issue. Other manuscripts that are acceptable but cannot be included in the issue will be scheduled for publication in a subsequent issue of *JMR*.

Papers must be accompanied by a photo (uploaded separately as a high resolution TIF or EPS file) and 200–300 word bio of the Early Career Scholar only. These materials must be submitted along with the original submission of the paper.

jmr@mrs.org
Please contact jmr@mrs.org with questions.

CALL FOR PAPERS