



2016 **MRS**[®] FALL MEETING & EXHIBIT
November 27 – December 2, 2016 | Boston, Massachusetts

2016 MRS FALL MEETING SYMPOSIA

Preregistration Opens Mid-September

BROADER IMPACT

- B11 Today's Teaching and Learning in Materials Science—Challenges and Advances
- B12 The Business of Materials Technology

BIOMATERIALS AND SOFT MATERIALS

- BM1 Spatiotemporally and Morphologically-Controlled Biomaterials for Medical Applications
- BM2 Stimuli Responsive Organic and Inorganic Nanomaterials for Biomedical Applications and Biosafety
- BM3 Biomaterials for Regenerative Medicine
- BM4 Materials and Manufacturing of Biointerfaces Devices and Stretchable Electronics
- BM5 Materials for Biointegrated Photonic Systems
- BM6 Fabrication, Characterization and Applications of Bioinspired Nanostructured Materials
- BM7 Functional Nanostructured Polymers for Emerging Energy Technologies

ELECTROCHEMISTRY

- EC1 Redox Activity on the Molecular Level—Fundamental Studies and Applications
- EC2 Facilitating Charge Transport in Electrochemical Energy Storage Materials
- EC3 Catalytic Materials for Energy and Sustainability
- EC4 Material, Devices and Systems for Sustainable Conversion of Solar Energy to Fuels
- EC5 Proton Transfer and Transport—From Biological Systems to Energy Applications

ELECTRONICS, MAGNETICS AND PHOTONICS

- EM1 Materials Issues for Quantum Computing
- EM2 Rare-Earths in Advanced Photonics and Spintronics
- EM3 Electronic and Ionic Dynamics at Solid-Liquid Interfaces
- EM4 Structure-Property Relationships of Organic Semiconductors
- EM5 Materials and Mechanisms of Correlated Electronic Phenomena in Oxide Heterostructures
- EM6 Thin-Film Transistors—New Materials and Device Concepts
- EM7 Functional Plasmonics
- EM8 Spin Dynamics in Nonmagnetic Materials and Devices
- EM9 Materials and Nanostructures for Magnetic Skyrmions
- EM10 Emerging Materials and Technologies for Nonvolatile Memories
- EM11 Wide-Bandgap Materials for Energy Efficiency—Power Electronics and Solid-State Lighting
- EM12 Diamond Electronics, Sensors and Biotechnology—Fundamentals to Applications

ENERGY AND SUSTAINABILITY

- ES1 Materials Science and Chemistry for Grid-Scale Energy Storage
- ES2 Materials Challenges for Flow-Based Energy Conversion and Storage
- ES3 Perovskite Solar Cell Research from Material Properties to Photovoltaic Function
- ES4 Thermoelectric Polymers and Composites—Nontraditional Routes to High Efficiency
- ES5 Materials Research and Design for A Nuclear Renaissance
- ES6 Scientific Basis for Nuclear Waste Management

MECHANICAL BEHAVIOR AND FAILURE MECHANISMS OF MATERIALS

- MB1 Intermetallic-Based Alloys—From Fundamentals to Applications
- MB2 Materials under Mechanical Extremes
- MB3 High-Entropy Alloys
- MB4 Glassy, Nanocrystalline and Other Complex Alloy Systems and Their Applications
- MB5 Size Effects and Small-Scale Mechanical Behavior of Materials
- MB6 Cyclic Deformation and Fracture at the Nanoscale
- MB7 Shear Transformation Mechanisms and Their Effect on Mechanical Behavior of Crystalline Materials

NANOMATERIALS

- NM1 Semiconducting Nanowires, Nanoribbons and Heterostructures—Synthesis, Characterizations and Functional Devices
- NM2 2D Layers and Heterostructures beyond Graphene—Theory, Preparation, Properties and Devices
- NM3 Nanotubes and Related Nanostructures
- NM4 Nanomaterials-Based Solar Energy Conversion
- NM5 Nanomembrane Materials—From Fabrication to Application
- NM6 Nanoscale Materials and Devices by High-Temperature Gas-Phase Processes

PROCESSING AND MANUFACTURING

- PM1 Ion Beam-Enabled Nanoscale Fabrication, Modification and Synthesis
- PM2 Plasma Processing via Liquid for Life Sciences and Environmental Applications
- PM3 Science-Enabled Advances in Materials- and Manufacturing-Technologies
- PM4 Novel Materials, Fabrication Routes and Devices for Environmental Monitoring
- PM5 Hierarchical, Hybrid and Roll-to-Roll Manufacturing for Device Applications

THEORY, CHARACTERIZATION AND MODELING

- TC1 *In Silico* Materials Chemistry
- TC2 Design, Discovery and Understanding of Materials Guided by Theory, Computation and Data Mining
- TC3 Materials Issues in Art and Archaeology
- TC4 Advances in Spatial, Energy and Time Resolution in Electron Microscopy

www.mrs.org/fall2016

Meeting Chairs

Bernard Bewlay, GE Global Research
Silvija Gradečak, Massachusetts Institute of Technology
Sarah Heilshorn, Stanford University
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CALL FOR PAPERS

Abstract Submission Opens
September 13, 2016

Abstract Submission Deadline
October 13, 2016

CHARACTERIZATION, THEORY AND MODELING

- CM1 Emergent Material Properties and Phase Transitions Under Pressure
- CM2 Advanced Numerical Algorithms for Metallic Systems at the Mesoscale in Materials Science
- CM3 Computer-Based Modeling and Experiment for the Design of Soft Materials
- CM4 *In Situ* Electron Microscopy of Dynamic Materials Phenomena
- CM5 Mechanically Coupled Properties, Phenomena and Testing Methods in Small-Scale and Low-Dimensional Systems
- CM6 Dislocation Microstructures and Plasticity
- CM7 Genomic Approaches to Accelerated Materials Innovation

ELECTRONIC DEVICES AND MATERIALS

- ED1 Silicon-Carbide, Diamond and Related Materials for Quantum Technologies
- ED2 Materials and Devices for Neuromorphic-Engineering and Brain-Inspired Computing
- ED3 Physics, Chemistry and Materials for Beyond Silicon Electronics
- ED4 Luminescent Materials for Photon Upconversion
- ED5 Photoactive Nanoparticles and Nanostructures
- ED6 Nanostructured Quantum-Confined States for Advanced Optoelectronics
- ED7 Materials and Device Engineering for Beyond the Roadmap Devices in Logic, Memory and Power
- ED8 Development and Integration of Organic and Polymeric Materials for Thin-Film Electronic Devices
- ED9 Advanced Interconnects for Logic and Memory Applications—Materials, Processes and Integration
- ED10 Material Platforms for Plasmonics and Metamaterials—Novel Approaches Towards Practical Applications
- ED11 Phase-Change Materials and Their Applications—Memories, Photonics, Displays and Non-von Neumann Computing
- ED12 Quantum Sensing, Metrology and Devices
- ED13 Novel Photonic, Electronic and Plasmonic Phenomena in Materials
- ED14 Molecular and Colloidal Plasmonics—Synthesis and Applications

ENERGY STORAGE AND CONVERSION

- ES1 Perovskite Solar Cells—Towards Commercialization
- ES2 High-Capacity Electrode Materials for Rechargeable Energy Storage
- ES3 Materials for Multivalent Electrochemical Energy Storage
- ES4 Nanogenerators and Piezotronics
- ES5 Advances in Materials, Experiments and Modeling for Nuclear Energy
- ES6 Mechanics of Energy Storage and Conversion—Batteries, Thermoelectrics and Fuel Cells
- ES7 (Photo)electrocatalytic Materials and Integrated Assemblies for Solar Fuels Production—Discovery, Characterization and Performance
- ES8 Caloric Materials for Energy-Efficient Applications
- ES9 Surfaces, Coatings and Interfaces in Concentrated Solar Energy Applications

- ES10 Frontiers in Oxide Interface Spintronics—Magnetolectrics, Multiferroics and Spin-Orbit Effects
- ES11 Advanced and Highly Efficient Photovoltaic Devices
- ES12 Soft Magnetic Materials for Next-Generation Power Electronics
- ES13 Interfaces and Interphases in Electrochemical Energy Storage and Conversion
- ES14 Thin-Film Chalcogenide Semiconductor Photovoltaics

NANOMATERIALS

- NM1 Emerging Non-Graphene 2D Materials
- NM2 Nanoscale Heat Transport—From Fundamentals to Devices
- NM3 Aerogels and Aerogel-Inspired Materials
- NM4 Novel Catalytic Materials for Energy and Environment
- NM5 Frontiers in Terahertz Materials and Technology
- NM6 Mechanical Behavior of Nanostructured Composites
- NM7 Semiconductor Nanowires for Energy Applications
- NM8 2D Materials—Macroscopic Perfection vs. Emerging Nanoscale Functionality
- NM9 High-Performance Metals and Alloys in Extreme Conditions
- NM10 Micro/Nano Assembling, Manufacturing and Manipulation for Biomolecular and Cellular Applications

SOFT MATERIALS AND BIOMATERIALS

- SM1 Bioelectronics—Materials, Processes and Applications
- SM2 Advanced Multifunctional Fibers and Textiles
- SM3 Advanced Biomaterials for Neural Interfaces
- SM4 A Soft Future—From Electronic Skin to Robotics and Energy Harvesting
- SM5 Aqueous Cytomimetic Materials
- SM6 Materials in Immunology—From Fundamental Material Design to Translational Applications
- SM7 Emerging Membrane Materials for Sustainable Separations
- SM8 Advanced Polymers

Meeting Chairs

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Submission Deadline—October 1, 2016



Microstructural Characterization for Emerging Photovoltaic Materials

Emerging solar cell technologies, in particular those based on organic molecules and polymers, inorganic-organic perovskites, and kesterite-based semiconductors have begun demonstrating their potential for inexpensive solar energy on a terawatt scale. Increasing the power conversion efficiency and device lifetimes of these materials requires exercising nanoscale control over thin film microstructure and device interfaces across large areas. Each of these systems has presented unique challenges to their full morphological and microstructural characterization, with issues ranging from poor scattering contrast between layers (organics) to overlapping diffraction features (kesterites). Advances in x-ray and neutron scattering methods have enabled breakthroughs in understanding the relationship between thin film microstructure and device-level properties in these emerging energy materials, findings which have propelled photovoltaic performance over the last decade. Increased access to synchrotron and neutron sources, coupled with the development of new tools and techniques that merge scattering and spectroscopic information, are providing exciting opportunities to probe the microstructural evolution of these materials from fabrication through to fully operational devices subject to real-world environments.

Research papers are solicited in the use of x-ray and neutron characterization methods to monitor microstructure of these emerging energy materials, in particular methods that enable thin-film monitoring under fabrication and/or operational conditions. Approaches that demonstrate applications to the improved design and fabrication of materials and devices—affording insights into the underlying chemistry, materials science, and photophysics—are highly encouraged.

The issue will have a special emphasis on:

- ◆ Techniques that enable quantitative correlation between electronic performance and bulk microstructural evolution of emerging solar cell technologies, highlighting X-ray and neutron tools, but not excluding other approaches
- ◆ *In-situ* and *in-operando* techniques for monitoring physico-chemical interactions during photovoltaic device operation, including spectroscopic methods
- ◆ New experimental and computational approaches for classifying and quantifying structural properties in molecular and disordered electronic materials
- ◆ Integration of characterization tools in process monitoring for scalable module fabrication

GUEST EDITORS

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Chris Nicklin, Diamond Light Source, United Kingdom

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MANUSCRIPT SUBMISSION

To be considered for this issue, new and previously unpublished results significant to the development of this field should be presented. The manuscripts must be submitted via the *JMR* electronic submission system by **October 1, 2016**. Manuscripts submitted after this deadline will not be considered for the issue due to time constraints on the review process. **Submission instructions may be found at www.mrs.org/jmr-instructions**. Please select “Focus issue: *Microstructural Characterization for Emerging Photovoltaic Materials*” as the manuscript type. **Note our manuscript submission minimum length of 6,000 words**. All manuscripts will be reviewed in a normal but expedited fashion. Papers submitted by the deadline and subsequently accepted will be published in the Focus Issue. Other manuscripts that are acceptable but cannot be included in the issue will be scheduled for publication in a subsequent issue of *JMR*.

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The Society's interdisciplinary approach to the exchange of technical information is qualitatively different from that provided by single-discipline professional societies because it promotes technical exchange across the various fields of science affecting materials development. MRS sponsors two major international annual meetings encompassing many topical symposia, as well as numerous single-topic scientific meetings each year. It recognizes professional and technical excellence, conducts tutorials, and fosters technical exchange in various local geographical regions through Section activities and Student Chapters on university campuses.

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