Journal of MATERIALS RESEARCH
FOCUS ISSUE • MAY 2017

Submission Deadline—October 1, 2016

CALL FOR PAPERS

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

Moritz Riede, University of Oxford, United Kingdom
Chris Nicklin, Diamond Light Source, United Kingdom
Dean M. DeLongchamp, National Institute of Standards and Technology, USA

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

2017 MRS® SPRING MEETING & EXHIBIT

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CALL FOR PAPERS

Abstract Submission Opens
September 13, 2016

Abstract Submission Deadline
October 13, 2016

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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—Magnetoelectrics, 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

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BI1 Today's Teaching and Learning in Materials Science—Challenges and Advances

BI2 The Business of Materials Technology

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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

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EM12 Diamond Electronics, Sensors and Biotechnology—Fundamentals to Applications

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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

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MB2 Materials under Mechanical Extremes

MB3 High-Entropy Alloys

MB4 Glassy, Nanocrystalline and Other Complex Alloy Systems and Their Applications

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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

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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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