Journal of MATERIALS RESEARCH
FOCUS ISSUE · JANUARY 2015

Submission Deadline—May 15, 2014

CALL FOR PAPERS

Soft Nanomaterials

After decades of intensive research, a number of novel techniques have been developed for the large scale production of nanomaterials such as nanoparticles, quantum dots, nanowires, carbon nanotubes, biomolecules, nanofilms and graphene. It has been recently shown that the unique properties of these nanomaterials can lead to extraordinary properties and functionalities when combined with organics and polymers. Design of these soft nanomaterials enables the harnessing and achievement of new properties through the deformations and instabilities affected by the organics. Examples include unfolding of proteins and DNA, super-plasticity of carbon nanotubes, strain engineering of graphene, and energy harvesting with nanowires, amongst others. However, a grand challenge still exists to control the deformations and instabilities of large-scale nanomaterials for scaling-up functions and applications that will impact society. A key approach that is emerging is to use soft materials such as polymers, gels and biomaterials to assemble large amounts of nanomaterials and to regulate the deformations and instabilities in designed and controlled manners. Successful examples range from nanostructured tissues, such as bones and cartilage found in nature, to polymer composites with nanowire/nanotube/graphene, flexible electronics, nanogenerators and nanobatteries. The convergence and interactions of soft materials and nanomaterials have resulted in exciting opportunities for discoveries, inventions and commercialization.

This Focus Issue seeks to collect papers from leading research groups with diverse backgrounds in soft materials and nanomaterials to discuss the scientific and technological frontiers of soft nanomaterials. Submissions will cover experimental, theoretical and computational aspects of soft nanomaterials. Contributions that address applications and commercialization of soft nanomaterials are also strongly encouraged.

Contributed papers are solicited in the following areas:

- Biomolecules capable of large deformations, such proteins and DNA
- Cell membranes under deformation and failure
- Self-assemblies of soft nanomaterials, such as DNA and protein origami
- Nanostructured tissues, such as bones and cartilages
- Polymers and gels at the nanoscale
- Stretchable electronics with functional nanocomponents
- Soft materials in nanomedicine
- Nanobatteries and nanogenerators
- Polymer composites of nanowire/nanotube/graphene
- Interfaces between nanomaterials and soft materials

GUEST EDITORS

Nicola M. Pugno, University of Trento, Italy
Xuanhe Zhao, Duke University
Markus J. Buehler, Massachusetts Institute of Technology

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 May 15, 2014. 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: *Soft Nanomaterials*" as the manuscript type. 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.

jmr Journal of MATERIALS RESEARCH
FOCUS ISSUE · FEBRUARY 2015

Submission Deadline—June 15, 2014

CALL FOR PAPERS

In-situ and *Operando* Characterization of Materials

Materials studies under *in-situ* and *operando* conditions in many cases provide key information towards understanding properties and function. Remarkable advances in analytical tools and data modeling have been made in recent years, with *in-situ* and *operando* analysis continually evolving to exploit these new capabilities. Accurate and reliable *in-situ* analysis necessitates careful development of experimental protocols because of the complex sample fixturing and/or measurement automation required to control one or more variables during experimentation. Typically, *in-situ* studies generate large data sets that may be treated using new "parametric" approaches, wherein all individual datasets are considered as a single experimental observation. Control over temperature, pressure, and/or electric and magnetic fields, or even the introduction of reactive or process gasses, allows studies of active materials under operating conditions. Such *operando* studies probe specimens in the true operating environment, often requiring new and unique sample environment systems. This Focus Issue aims to capture the most recent advances in *in-situ* and *operando* analysis over a broad range of characterization tools.

Contributed papers are solicited in the following areas:

- Phase transitions driven by temperature, pressure, or electric & magnetic fields
- Electrochemical processes
- Charge and/or energy carrier insertion/extraction and diffusion
- Sorbent and separation reactions
- Surface reactions at solid-gas interfaces, including chemical and photo catalysis
- Behaviors of defects in bulk, surface, and grain boundary regions
- Advances in analysis tools and techniques
- New approaches to data analysis, including parametric refinement and global optimizations.

GUEST EDITORS

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Eric A. Stach, Brookhaven National Laboratory
Bryan D. Huey, University of Connecticut
Vanessa K. Peterson, Australian Nuclear Science and Technology Organisation

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BIOMATERIALS AND SOFT MATERIALS

- A Organic Bioelectronics
- B Multifunctional Polymeric and Hybrid Materials
- C Medical Applications of Noble Metal Nanoparticles (NMNPs)
- D Materials and Concepts for Biomedical Sensing
- E Hard-Soft Interfaces in Biological and Bioinspired Materials—Bridging the Gap between Theory and Experiment
- F Reverse Engineering of Bioinspired Nanomaterials
- G Plasma Processing and Diagnostics for Life Sciences
- H Micro/Nano Engineering and Devices for Molecular and Cellular Manipulation, Stimulation and Analysis
- I Emerging 1D and 2D Nanomaterials in Health Care

ELECTRONICS AND PHOTONICS

- J Emerging Non-Graphene 2D Atomic Layers and van der Waals Solids
- K Graphene and Graphene Nanocomposites
- L Optical Metamaterials and Novel Optical Phenomena Based on Nanofabricated Structures
- M Materials and Technology for Nonvolatile Memories
- N Frontiers in Complex Oxides
- O Oxide Semiconductors
- P Hybrid Oxide/Organic Interfaces in Organic Electronics
- Q Fundamentals of Organic Semiconductors—Synthesis, Morphology, Devices and Theory
- R Diamond Electronics and Biotechnology—Fundamentals to Applications

ENERGY AND SUSTAINABILITY

- S Advances in Materials Science, Processing and Engineering for Fuel Cells and Electrolyzers
- T Wide-Bandgap Materials for Solid-State Lighting and Power Electronics
- U Organic Photovoltaics—Fundamentals, Materials and Devices
- V Sustainable Solar-Energy Conversion Using Earth-Abundant Materials
- W Perovskite-Based and Related Novel Material Solar Cells
- Y Technologies for Grid-Scale Energy Storage
- Z Materials Challenges for Energy Storage across Multiple Scales
- AA Synthesis, Processing and Mechanical Properties of Functional Hexagonal Materials for Energy Applications
- BB Molecular, Polymer and Hybrid Materials for Thermoelectrics
- CC Advanced Materials and Devices for Thermoelectric Energy Conversion
- DD Materials for Advanced Nuclear Technologies
- EE Scientific Basis for Nuclear Waste Management XXXVIII
- FF Materials as Tools for Sustainability

NANOMATERIALS AND SYNTHESIS

- GG Nanomaterials for Harsh Environment Sensors and Related Electronic and Structural Components—Design, Synthesis, Characterization and Utilization
- HH Flame and High-Temperature Synthesis of Functional Nanomaterials—Fundamentals and Applications
- II Semiconductor Nanocrystals, Plasmonic Metal Nanoparticles, and Metal-Hybrid Structures
- JJ 3D Mesoscale Architectures—Synthesis, Assembly, Properties and Applications
- KK Directed Self-Assembly for Nanopatterning
- LL Semiconductor Nanowires—Growth, Physics, Devices, and Applications
- MM Carbon Nanotubes—Synthesis, Properties, Functionalization and Applications

THEORY, CHARACTERIZATION AND MODELING

- NN Mathematical and Computational Aspects of Materials Science
- OO *In Situ* Characterization of Dynamic Processes during Materials Synthesis and Transformation
- PP Advances in Scanning Probe Microscopy for Multimodal Imaging at the Nanoscale
- QQ Advances in Nanoscale Subsurface, Chemical and Time-Resolved Studies of Soft Matter
- RR Scaling Effects in Plasticity—Synergy between Simulations and Experiments
- SS Informatics and Genomics for Materials Development
- TT Advanced Materials Exploration with Neutrons and X-Rays—The State-of-the-Art in the International Year of Crystallography

GENERAL

- UU Structure-Property Relations in Amorphous Solids
- VV Reactive Materials—Past, Present and Future
- WW Defects and Radiation Effects in Advanced Materials
- XX Bridging Scales in Heterogeneous Materials
- YY Advanced Structural and Functional Intermetallic-Based Alloys
- ZZ Hierarchical, High-Rate, Hybrid and Roll-to-Roll Manufacturing
- AAA Undergraduate Research in Materials Science—Impacts and Benefits

Meeting Chairs

Husam N. Alshareef King Abdullah University of Science and Technology
Amit Goyal Oak Ridge National Laboratory
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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 three 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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