

Submission Deadline—June 15, 2014



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, when 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.

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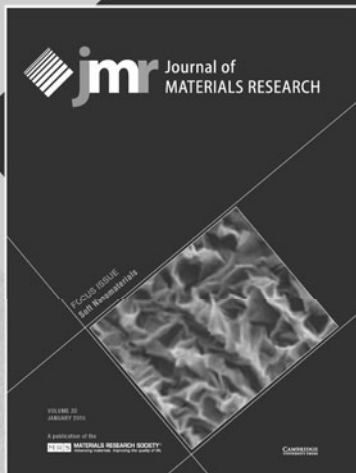
Vanessa K. Peterson, Australian Nuclear Science and Technology Organisation

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To be considered for this issue, new and previously unpublished results significant to the development of this field should be presented.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 June 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: *In-situ* and *Operando* Characterization of Materials” 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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CALL FOR PAPERS



Submission Deadline—May 15, 2014

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

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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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