jmr Journal of MATERIALS RESEARCH
FOCUS ISSUE • MARCH 2017

EXTENDED SUBMISSION DEADLINE—August 1, 2016

CALL FOR PAPERS

Aberration Corrected Transmission Electron Microscopy

Spherical and chromatic aberration correctors in transmission and in scanning transmission electron microscopes (TEM/STEM) have become commercially available in recent years. They are comprised of electromagnetic multipoles driven by ultra-stable power supplies in conjunction with faster and more efficient hard- and software for image acquisition, analysis, and alignment. This technology has significantly improved the spatial resolution, down to the size of the Bohr radius under certain conditions so that the atomic scattering in the sample can limit the resolution, rather than the microscope.

Focus now needs to shift towards new scientific areas that can be addressed with this novel equipment, taking into account the improved resolution, reduced thermal drift, novel electron detectors, and larger pole-piece gaps, due directly or indirectly to the advent of aberration correction. The parameter space for operation has become much more complex, so operators need to carefully plan experiments to find the best way to extract meaningful data. In particular, the high voltage should be optimized to minimize radiation damage. Better resolution may involve higher electron doses but imply more beam damage. Increased stability allows fast experiments with highly focused electron probes. More sensitive detectors can be used to test new data acquisition schemes as well as to reduce the electron dose. Consideration must be given as to whether the fascinating *in-situ* studies of the kinetics of atomic growth mechanisms now possible will allow meaningful inference to be drawn on thermodynamic properties representative of the bulk. *In-operando* studies of specimens in their engineered application environment (i.e. in gaseous or liquid atmosphere, under electrical bias, strain, illumination, etc.) can be conducted at nano-scale resolution.

This Focus Issue will include imaging, spectroscopy, and diffraction based (S)TEM applications to materials science problems with planar or focused illumination.

Contributed articles are particularly sought in the following areas:

- Resolution vs. quantification issues in quantitative high-resolution imaging
- Quantitative spectroscopy for local measurements of chemistry or electronic properties
- Limitations due to radiation damage
- Comparing studies by planar and focused illumination: evaluating dose vs. dose rate effects
- Applications of chromatic aberration correction, monochromation, and low energy studies
- Applications of improved electron detectors and novel acquisition schemes
- *In-situ* strain measurements and *in-operando* catalysis studies

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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 **August 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: *Aberration Corrected Transmission Electron Microscopy"* as the manuscript type. **Note our manuscript submission minimum length of 6000 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.

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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

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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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