MRS Symposium BBB: Advances in Scanning Probe Microscopy for Material Properties

Scanning Probe Microscopy (SPM) has become a quintessential tool of nanoscience. Specifically, the last few years have witnessed a revolution of the capabilities offered by SPM to manipulate, interrogate materials and explore material properties at the atomic, molecular, and nanoscales. While rich developments of SPM have been undertaken over the last decade, significant efforts are still ongoing to tackle challenges associated with local phenomena in metals, semiconductors, ceramics, polymers and biomaterials. In addition to adapting new analytical tools with sufficient sensitivity for measurements with nanoscale spatial resolution, cantilever dynamics and designs, as well as novel data processing methods, are of tremendous relevance to the current needs in materials science. The purpose of this symposium is to bring together pioneers, from both academia and industry, who focus on advancing SPM techniques to increase the speed, resolution and breadth of what is measurable at the nanoscale. At the same time, this symposium aims to assemble leading SPM researchers who are applying these advanced SPM techniques to explore material properties. Therefore, this symposium will offer a particular emphasis on applications of advanced SPM solutions for novel and improved materials characterization.

Topics will include (but will not be limited to):

- Local probing of electrical, ferroelectric, magnetic, mechanical, electromechanical and electrochemical properties
- Novel developments of SPM techniques: multifrequency approaches, multidimensional data acquisition and visualization
- Novel SPM techniques combined with electromagnetic actuation, Raman spectroscopy, electron spectroscopy, etc.
- Novel developments of SPM probes: functional and shielded probes, cantilever interactions and designs
- Analysis of large SPM data sets
- High-speed SPM
- Theory and modeling
- Atomic, molecular and nanoscale manipulation
- SPM studies in devices and nanostructures
- SPM studies of biological systems

A joint session with Symposium YY: Meeting the Challenges of Understanding and Visualizing Mesoscale Phenomena, relating to analysis of large and complex SPM data, is being considered.

Invited speakers include:

Toshio Ando (Kanazawa Univ., Japan), Paul Ashby (Lawrence Berkeley National Lab), Ricardo Garcia (Inst. de Microelecórónica de Madrid, Spain), David Ginger (Univ. of Washington), Alexei Gruverman (Univ. of Nebraska-Lincoln), Stephen Jesse (Oak Ridge National Lab), Jason Killgore (National Inst. of Standards and Technology), Jacqueline Krim (North Carolina State Univ.), Angelika Kuehne (J. Gutenberg Univ. Mainz, Germany), Amit Kumar (Queens Univ., United Kingdom), Eric Leniewska (Univ. de Bourgogne, France), Sang-il Park (Park Systems Corp., Korea), Roger Proksh (Asylum Research), Arvind Raman (Purdue Univ.), Maria Ricci (École Polytechnique Fédérale de Lausanne, Switzerland), John Sader (California Inst. of Technology), Thomas Taubner (RWTH Aachen Univ., Germany), Robert Westervelt (Harvard Univ.).

Symposium Organizers

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