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November 29-December 1, 2004, Boston, Massachusetts, U.S.A.

Edited by David C. Martin, David A. Midler, Paul A. Midgley and Eric A. Stach
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**MATERIALS RESEARCH SOCIETY
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**Electron Microscopy of
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Mechanical Behavior,
Chemistry and Structure**

Symposium held November 29–December 1, 2004, Boston, Massachusetts, U.S.A.

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PREFACE

These papers were presented at Symposium P, " Electron Microscopy of Molecular and Atom-Scale Mechanical Behavior, Chemistry and Structure," held November 29–December 1 at the 2004 MRS Fall Meeting in Boston, Massachusetts. The symposium was organized by Prof. David Muller from Cornell, Dr. Paul Midgley from the University of Cambridge, Prof. Eric Stach from Purdue, and Prof. David C. Martin from the University of Michigan.

From the imaging and spectroscopy of individual dopant atoms and clusters buried inside a semiconductor host to the three-dimensional tomography of nanoparticles, virii, and biological structures; and the in situ observations of nanomechanical deformation and electrodeposition; advances in instrumentation and algorithms have dramatically changed the field of electron microscopy. Early results in sub-angstrom resolution and millivolt spectroscopy are now being applied to materials problems, and international initiatives in aberration-corrected instruments should make such facilities available to the wider community. The goal of the symposium was to showcase how electron microscopy is applied to materials problems and to encourage the cross-fertilization of ideas and techniques between the solid-state and biological communities.

Topics of the symposium included:

- Three-dimensional electron tomography for nanoparticles, semiconductor devices, and biological materials
- Electron holography: from magnetic bacteria to doped semiconductors
- Imaging of single atoms, clusters, and vacancies inside materials
- Electron energy-loss spectroscopy at high spatial and energy resolution
- Aberration-corrected HRTEM and STEM for sub-angstrom imaging
- Low voltage and cryo-electron microscopy of polymers and biomaterials
- In situ microscopy of deformation and growth

The oral sessions of symposia included 1) Atomic and Subatomic Imaging and Spectroscopy, 2) Electron Energy Loss Spectroscopy for Subnanometer Chemical and Optical Properties, 3) Three-Dimensional Nanoscale Characterization, 4) Quantitative Electron Microscopy: Holography, Dopant Profiling and Diffraction, 5) Imaging Individual Structures and Defects in Bio- and Nano-Materials, and 6) In Situ Microscopy of Deformation and Growth (Even in Liquids).

The organizers of this symposium would like to thank the generous contributions of our sponsors Delong Instruments, USA, E. A. Fischione Instruments, FEI Company, and JEOL USA.

David C. Martin
David A. Muller
Paul A. Midgley
Eric A. Stach

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