Probing Mechanics at Nanoscale Dimensions
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These proceedings are a record of Symposium II, “Probing Mechanics at Nanoscale Dimensions,” held April 14–17 at the 2009 MRS Spring Meeting in San Francisco, California.

Mechanical properties and the reliability of materials greatly depend on the details of their microstructure. However, most engineered materials, which are often polycrystalline and multiphase in nature and have undergone a number of processing steps, are extremely complex and inhomogeneous at the local level. The precise relationship between microstructure and physical properties for these types of materials is an issue that becomes even more critical as device dimensions rapidly decrease toward nanoscale dimensions (nanomaterials and NEMS).

During the last decade, new experimental tools have emerged, allowing us to access information on the microstructure and state of deformation of materials at a fine spatial resolution ranging from microns down to tens of nanometers. In parallel, developments in computational materials simulation are now able to incorporate discretization (grain, grain boundaries, and defects) into modeling, which is a necessary step to obtain a thorough multiscale, theoretical understanding of material properties. This symposium was aimed to cover both the theoretical and experimental aspects on how to define and measure stress, strain, and the deformation of materials at the appropriate microstructural level of grain, grain boundaries, and other defects.

The order of the papers in this volume follows the order of their presentation at the MRS Meeting. Papers presented during posters sessions are at the end of the proceedings.

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