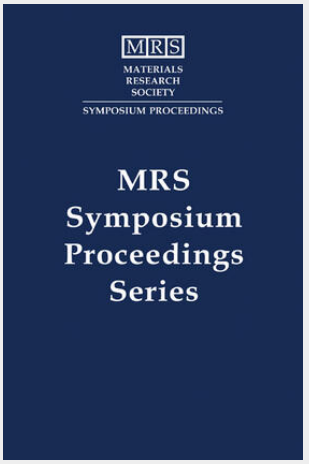
Taumura / Minor / Murray

Probing Mechanics at Nanoscale Dimensions

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 an extensive amount of processing, 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 the nanoscale. Recently new experimental tools have emerged that provide 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 now incorporate discretization into modeling, which is necessary in obtaining a thorough multiscale, theoretical understanding of material properties. This book offers views on defining and measuring stress, strain, and deformation of materials at the appropriate microstructural level of grain, grain boundaries and other defects.



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