ADVANCES IN MECHANICS OF ONE-DIMENSIONAL MICRO/NANOMATERIALS

This special issue of the Journal of Materials Research contains articles that were accepted in response to an invitation for manuscripts.

Introduction

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With the emerging field of nanotechnology there has been significant focus on nanostructures and a plethora of publications describes their unique opto-electronic properties. Their corresponding mechanical behavior, however, is less understood and novel experimental, theoretical, and simulation methods are needed to fully characterize the stress-strain response and mechanical constants of one-dimensional materials. The purposes of this issue, therefore, are to provide a summary of what has been done, and to motivate more researchers in the engineering community to study the mechanics of these fascinating material configurations.

The articles presented herein illustrate approaches that were successfully applied for capturing the mechanical response of sub-micron volumes, such as nanopillars, nanowires, nanofibers, and nanobeams. The experimental techniques employed in these articles range from in-situ TEM mechanical testing to synchrotron Laue x-ray microdiffraction, while the theoretical and simulation methods provide the frameworks for gradient plasticity, disclination and dislocation theory, discrete dislocation dynamics and finite element analysis. The articles are arranged so as to first present the experimental works documenting the response of a particular configuration, followed by corresponding theoretical models that can treat such materials. Particular focus is given on Si nanostructures as they offer the most applications and are the most well understood of the materials systems studied to date.

It is hoped that the readers will benefit by reading these articles and will be prompted to contribute further to the understanding of these unique nanostructures. Readers may also be interested in the *Journal of Materials Research* September 14, 2011, Vol. **26**(17) Focus Issue on Nanowires: Fundamentals and Applications.

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