PURDUE UNIVERSITY

PURDUE MATERIALS ENGINEERING

Materials Engineering Summer 2017 Seminar

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Deformation Mechanisms in Nanotwinned Structures

Abstract

Although the nineties witnessed an intensity of research on nanocrystalline metals due to their ultra-high strength, the early enthusiasm was dampened by the discovery that the gain in strength is accompanied by a concomitant loss of grain stability and increase in brittleness. In sharp contrast, research over the past few years has provided compelling evidence that nanotwinned structures may be the optimal motifs for the design of both *high-strength* and *high-ductility* materials. These discoveries have not only opened avenues for critical structural applications, but have also raised several basic materials science questions. In this talk, I will present our computational studies that elucidate the deformation mechanisms governing these attractive properties of nanotwinned fcc metals. In particular, the talk will focus on two aspects: the intrinsic fracture response of coherent twin boundaries, and the atomistic underpinnings of twin stability even at high temperatures.

Biography

Yashashree Kulkarni is an Associate Professor in the Department of Mechanical Engineering at University of Houston. She received her Bachelor's degree from Indian Institute of Technology Bombay, India, and her Ph.D. in Applied Mechanics from Caltech where she worked on multi-scale modeling of materials. She was a postdoctoral scholar at University of California San Diego before joining the University of Houston as an Assistant Professor in 2009. Her research interests focus on atomistic simulations and multi-scale modeling of material response, and elucidating deformation mechanisms in nanostructured materials for novel structural applications. She has been the recipient of the DARPA Young Faculty Award (2010), the Bill D. Cook Professorship (UH, 2012-17), Kittinger Teaching Excellence Award (UH, 2016), and the Sia Nemat-Nasser Early Career Award (ASME, 2017).