



MateriAlZ Seminar Series

Interface-Microstructure-Enabled Mechanical Behavior of Metallic Nanocomposites

Friday, November 20, 2020, 11 am (MST)

Abstract

Mechanical behavior of metallic materials is strongly influenced by the microstructure. For example, grain refinement can result in significant increase in yield strength, but nanostructured materials lack plastic deformability and toughness. This presentation will review the recent progress in the synthesis and mechanical behavior of metallic composites that have hierarchical microstructures comprised of multiple phases with varying structures, morphologies and sizes across nano-to-micro length scales. Examples will be presented from different model systems such as physical vapor deposited thin films (Cu-Mo) and laser rapid solidified Al-Si eutectics. The common aspects in interface-dominated mechanical behavior in hierarchical metallic composites such as unusually high flow strengths, high strain hardening rates, plastic co-deformability and suppression of shear bands will be highlighted. The role of in situ straining experiments in TEM and SEM, and integration with atomistic modeling, dislocation theory and crystal plasticity in understanding mechanical behavior will be emphasized.

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Amit Misra is Department Chair and Edward DeMille Campbell Collegiate Professor of Materials Science and Engineering at the University of Michigan (UM), Ann Arbor. Previously, he worked at Los Alamos National Laboratory (LANL) until May 2014. He received his Bachelor's degree in Metallurgical Engineering in 1989 from the Institute of Technology, BHU, India, and Ph.D. in Materials Science & Engineering from University of Michigan in 1994. He has mentored over 40 postdoctoral researchers and PhD students at LANL and UM, and received the LANL Distinguished Postdoc Mentor Award. He has co-authored over 350 peer-reviewed articles. He is a principal Editor of *Materials Research Letters* and Chair of Editorial Board of *MRS Bulletin*. He has been recognized as Fellow of AAAS, Materials Research Society, ASM International and LANL, and with TMS awards such as Brimacombe Medalist, MPMD Distinguished Scientist/Engineer and MPMD Distinguished Service.



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