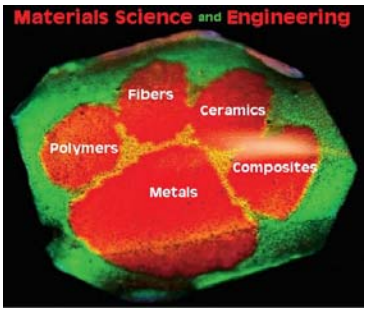

Seminar Series

Sponsored by
School of Materials Science and Engineering

Dr. Irene J. Beyerlein
Los Alamos National Laboratory, Los Alamos, NM 87545
Irene@lanl.gov

PLASTIC ANISOTROPY OF SEVERELY PROCESSED MATERIALS

Thursday, November 2, 2006
12:30 PM
Room 200 Olin Hall

Abstract

Performing mechanical testing on a severely processed material imposes, in most situations, a strain path change to the material. Subgrain microstructural effects and their interactions with texture and grain morphology play dominant roles in the mechanical behavior after a strain path change. Strain path changes will therefore pose a demanding test for constitutive laws. We are currently developing fcc crystal hardening laws applicable under strain path changes. The formulation makes use of criteria to indicate when an individual grain undergoes a strain path change. If satisfied the critical resolved shear stresses are adjusted by additional stresses which represent the temporary but important changes in the hardening after a strain path change. When implemented into a polycrystal model, the resulting constitutive model can account for both texture and microstructural evolution in pre-straining and re-loading. The predictions for polycrystal behavior reproduce well the measured responses in pure reversal and equal channel angular extrusion (ECAE) reload experiments found in the literature. We also show that the model forecasts significant tension-compression asymmetry after ECAE.

Bio:

Education: Ph.D., 1997, Theoretical & Applied Mechanics, Cornell University, NY
Minors: Materials Science; Probability and Statistics
B.S., 1993, Mechanical Engineering, Clemson University, SC

Recent Honors: J. R. Oppenheimer Fellow at Los Alamos National Laboratory (1997-2000)
Los Alamos National Laboratory Achievement award (1999)
Mentored student under an MIT-LANL grant for MIT graduate students (2000-2002)
Mentored student under an STB Distinguished Graduate Student Award (2004)
Institute of Physics selected paper award (2005)

Research: Single crystal deformation under high strain rates
Model-driven Manufacturing of Nanostructured Metals
Materials and Engineering Physics, HCP materials