

The Department of
Mechanical Engineering
PRESENTS

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11:10-12:00PM

Atomic-Scale Understanding of Deformation Mechanisms in Advanced Metallic Materials

Abstract:

The design of advanced metallic materials with enhanced mechanical properties is always based on microstructural optimization and proper control of the nucleation and propagation of crystalline defects such as dislocations and twins.

In 1956, the movement of a dislocation was observed for the first time in an Al foil through transmission electron microscopy. Since then, further developments on electron microscopy have allowed us to not only characterize those defects at higher resolution, but also to study *in-situ* their dynamic interaction during deformation.

In this talk, I will present current methodologies based on *in-situ* nanomechanical testing and cutting-edge characterization techniques to understand, at the atomic scale, phenomena such as the role of dislocations and nanotwins on the strength and ductility of nanostructured Mg alloys, thermal stability of nanocrystalline materials, the dynamic interaction between solute atoms and dislocations in body centered cubic alloys, among others. Computer simulations using the most advanced interatomic potentials are being implemented in support of our experimental approaches. Combined, these techniques are breaking new ground and providing a framework for the design of advanced structural materials.

About the Speaker:

Marta Pozuelo is a Research Scientist and a Lecturer in the Materials Science and Engineering Department at the University of California, Los Angeles (UCLA). She received her Ph.D. in Physics and Materials Science from the Complutense University of Madrid, Spain in 2004. After completing her Ph.D. on high performance steel laminated composites, she carried out post-doctoral research on high-nitrogen stainless steels with Prof. Georg Frommeyer at the Max-Planck Institute in Dusseldorf, Germany. In 2005 she obtained a Fulbright Fellowship to work on precipitation hardening of Ni-based superalloys with Prof. Alan J. Ardell at UCLA. Her current research interest focuses on nanostructured metallic materials, with emphasis on the atomic-scale characterization of their deformation mechanisms. She has published over 47 articles in international journals including Nature, Nano Letters, Scripta Materialia, Philosophical Magazine, Intermetallics, Materials Research Letters, Scientific Reports, Materials Letters, Materials Science and Engineering A, Composites Science and Technology, Metallurgical and Materials Transaction and others.