

UC SAN DIEGO NANOENGINEERING

Tuesday, March 7, 2017

Seminar Presentation: 11:00am – 12:00pm

Cymer Conference Center, SME 248

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Plastic deformation and strengthening mechanism of metals with nano-scale twins

Abstract:

The trade-off between the strengthening and ductility/fatigue stability/conductivity had become a bottleneck for the development of high performance metallic materials. In this talk, our efforts to strengthen metals via twin boundary at nanoscale will be described. It is demonstrated that introducing high density of nanotwins results in a significant increase in strength, but without compromising its ductility and conductivity. A strain-controlled cyclic stability is maintained in Cu with a highly oriented nanoscale twins after a short initial rapid cyclic hardening stage, which distinct from the continuous cyclic softening or hardening in polycrystalline Cu. In particular, switchable plastic properties as well as anisotropic deformation mechanisms in Cu with a highly oriented nanoscale twins are found by simply changing the loading orientations. The findings provide insights into the possible promising routes for optimizing the mechanical properties of nanostructured metals through tailor-designed interface and microstructure.

Biosketch:

Dr. Lei Lu is a Professor in Institute of Metal Research, Chinese Academy of Sciences, where she received her Ph.D. degree in 2000. Lu's interest focuses on the synthesis, microstructure characteristic and mechanical properties of nanostructured metallic materials, including nanograin, nanotwinned and gradient nanograin structures. She is a member of the International Community of Nanostructured Materials and serves for the *Acta Materialia* & *Scripta Materialia* journals as an editor.