Purdue University

School of Materials Engineering

Presents

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3:45 Seminar

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PURDUE MATERIALS ENGINEERING

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Grain Boundary Engineered Highly Nanotwinned Structures

ABSTRACT

Highly nanotwinned (nt) metals have shown a strength comparable to nanocrystalline metals, while maintaining other desired properties including ductility, conductivity, and thermal stability. However, the deformation mechanisms and mechanical stability of the nt metals is not yet fully understood but can be directly linked to large number of ∑3 boundaries present. In this presentation, results from highly aligned nt-Cu samples tested in compression, torsion, and tension under various loading/testing conditions relative to the twin boundary (TB) direction will be presented as well as thermal stability studies. The microstructures of the tested samples were analyzed before and after deformation for each loading configuration in order to study the stability of the nanotwins.

In all testing configurations, the nt structure was observed to be mostly stable, in which, to a significant extent, the nanotwins survived without major changes in twin size, orientation, or twin density. However, distinct differences in the overall deformation of the samples and in the extent of the changes were observed. The thermal stability is discussed with respect to the presence of the low energy nanotwins, triple junctions between the twins and columnar grains, texture and grain growth.

SHORT BIO

Dr. Andrea Hodge is an associate professor and the Philip and Cayley MacDonald Early Career Chair in the Aerospace and Mechanical Engineering Department with a joint appointment at the Mork Family Department of Chemical Engineering and Materials Science at USC. Prior to her position in academia she worked at Lawrence Livermore National Laboratory as a Staff Scientist from 2004 to 2007 and as a postdoctoral fellow from 2002-2004. She received her Ph.D. in Materials Science from Northwestern University in December 2002.

Professor Hodge leads the Materials Nanotechnology group at USC which includes a physical vapor deposition processing lab and a nanomechanics lab. Her research interests range from processing of nanocrystalline and nanoporous materials to nanomechanics of metals and biomaterials. She is an active member of The Metals and Materials Society (TMS), The Materials Research Society (MRS) and Society of Hispanic Professional Engineers (SHPE). She received the TMS Young Leader Award in 2004, an NSF BRIGE award in 2008 an NSF CAREER Award in 2010, ONR YIP and DARPA YFA in 2012. Professor Hodge has co-authored over 50 peer-reviewed publications and two book chapters.