SAND2016-4212C

Is *intrinsic* nanocrystalline stability practically achievable? Insights from investigations with Pt-Au alloys

Authors: N. Argibay, T. Furnish, D. Adams, P. Lu, M. Chandross, M. Rodriguez, B. L. Boyce, B. G. Clark, M. T. Dugger

Affiliation:
Sandia National Laboratories
Materials Science and Engineering Center
Albuquerque, NM, USA

The existence of intrinsic thermodynamically stable nanocrystalline binary metal alloys has been recently proposed and supported by demonstrations of stability through annealing of powders. Additionally, there is also a great deal of interest in understanding the impact of mechanical stress on this stability. In this presentation we discuss the results of an investigation on the stress and temperature dependent stability of a nanocrystalline noble-metal alloy (Pt-Au) in the form of sputtered thin films. In situ XRD and TEM annealing revealed extraordinary thermal stability, confirming literature predictions, while tribological experiments and molecular dynamics simulations enabled further exploration of the impact of stress as a destabilizing factor.

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000