Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Determination of porosity distribution in nanoporous Au by Fresnel coherent diffractive imaging[1] SANGSOO KIM, Argonne National Laboratory, YU-CHEN KAREN CHEN, Northwestern University, XIANGHUI XIAO, Argonne National Laboratory, MARK PFEIFER, La Trobe University, Melbourne, GARTH J. WILIAMS, University of Melbourne, COREY T. PUTKUNZ, La Trobe University, Melbourne, DAVID C. DUNAND, Northwestern University, IAN MCNULTY, Argonne National Laboratory — Nanoporous metallic foams have potential applications as chemical sensors, actuators, catalytic conversion systems, and voltage-tunable components. Due to the complex internal structure, the kinetics behind nanofoam formation by dealloying is not well understood, especially for nanoporous metals with pore radii less than 50 nm. We studied the morphology and local structure of a sample of nanoporous Au at 25 nm resolution by Fresnel coherent diffractive imaging with 2.2 keV x-rays. This approach enables thickness and density maps to be obtained at length scales approaching that possible with electrons with the penetration afforded by x-rays. We quantified the pore size distribution, an essential parameter to understand the kinematic mechanisms behind nanofoam formation, from the reconstructed images and exact thickness information. Extending this method to three dimensions will provide a complete picture of the pore distribution and local pore curvature, enabling greater understanding of the formation and properties of metallic nanofoams at the nanoscale.

[1]Supported by US-DOE #DE-AC02-06CH11357.

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Date submitted: 28 Nov 2009 Electronic form version 1.4