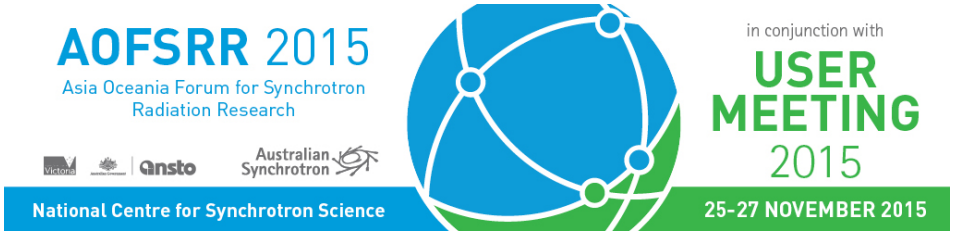

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Determination of kinetics of pores formation during temperature controlled chemical de-alloying of Au-Ag50 alloys by in-situ SAXS/WAXS

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The formation of nano-porous Au structures has potential for the design of advanced sensors, catalysts and bio-compatible separation media. Here, chemical de-alloying of Au-Ag50 alloy thin films were performed at different temperatures to alter the pore formation kinetics as well as the final morphology of the materials. Fractal dimensions at low q were significantly reduced with increasing temperatures affecting the fractal geometry of the pore propagation from surface fractal to volume fractal. The SAXS/WAXS in situ tests performed at the Australian Synchrotron were completed with scanning electron micrographs, x-ray diffraction, Kelvin probe and atomic force microscopy roughness determinations to produce a highly versatile nano-porous formation route. Following the Porod scattering model, the de-alloyed structures were found to be mathematically self-similar rather than amorphous and the pure Au ligaments dimension and the through pores size were found to increase by up to 50 % with increasing solutions temperature while the overall porosity was found to remain constant.

Keywords

In-situ, De-alloying, porous gold

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