Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Sorting Category: 14.2 (E)

Thermal-stability of Pd-Cu surface alloys investigated at the nanometer-scale by LEEM-IV analysis E. BUSSMANN, Sandia National Labs, NM, J. SUN, K. POHL, Univ. of New Hampshire, G. L. KELLOGG, Sandia National Labs, NM — Pd-Cu(100) surface alloys are interesting as model systems for metal/metal epitaxy, as well as for their catalytic properties, and as coatings, e.g. for electromigration resistance. We employ the LEEM-IV technique, with 8.5 nm spatial resolution and submonolayer chemical sensitivity, to investigate Pd interdiffusion into the Cu(100) surface. The LEEM-IV technique is sensitive to the layer-by-layer composition down to the fourth subsurface layer. After annealing a 0.4 ML Pd surface alloy at around 540 K, some regions of the surface develop a Cu_3Pd structure, a familiar bulk alloy phase. In other regions, the surface Pd concentration becomes dilute due to Pd diffusion into the bulk. We estimate the thermal activation barrier to Pd diffusion from the surface alloy into Cu bulk to be 1.7±0.15 eV. The LEEM allows real-time, real-space, observation of the interdiffusion process, and the concurrent evolution of the surface structure, at the nanometer scale. Sandia is operated by Sandia Corp., a Lockheed Martin Company, for the U. S. DOE's NNSA under Contract No. DE-AC04-94AL85000. Work at UNH is funded by the NSF under Grant No. DMR-0134933.

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Date submitted: 21 Nov 2008 Electronic form version 1.4