Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Highly-spatial resolved surface structure and composition by LEEM image intensity analysis J. SUN, Univ. of New Hampshire, J. B. HANNON, IBM Research Division, G.L. KELLOGG, Sandia Natl. Labs, K. POHL, University of New Hampshire, Department of Physics, Durham, NH 03824 — Controlling the local structure and composition of a surface alloy is of great importance in thin film technologies. However, measuring the alloy's heterogeneity is very difficult, because existing experimental techniques either assume lateral homogeneity or have limited subsurface or chemical sensitivity. In this work we have analyzed the electron diffraction intensity vs. incident energy curves of the (00) beam acquired from low-energy electron microscopy (LEEM) images. In contrast to conventional LEED-IV we are able to extract structural and local composition in the surface region with a lateral resolution of 8 nm. Two challenges in applying multiple electron scattering calculations to the analysis of LEEM data are the low and limited electron energy range (10 to 100 eV), which we address by a careful choice of the energy-dependent real and imaginary part of the optical potential. Our analysis of the LEEM IV curves for the clean Cu(001) and Pd/Cu(001) surfaces gives excellent agreement between experimental and best-fit data and good agreement with previous structural investigations. Our new analysis technique is capable of determining surface structure and composition with high accuracy.

Jiebing Sun
University of New Hampshire

Date submitted: 09 Dec 2005 Electronic form version 1.4