Abstract Submitted
for the TSF07 Meeting of
The American Physical Society

Studies of oxidation and thermal reduction of the Cu(100) surface using a slow positron beam W.B. MADDOX, N.G. FAZLEEV, M.P. NADESALINGAM, A.H. WEISS, Physics Department, University of Texas at Arlington — Positron probes of surfaces of oxides that play a fundamental role in modern science and technology are capable to non-destructively provide information that is both unique to the probe and complimentary to that extracted using other more standard techniques. We discuss recent progress in studies of oxidation and thermal reduction of the Cu(100) surface using positron-annihilation-induced Auger-electron spectroscopy (PAES). PAES measurements show a large increase in the intensity of the Cu M2,3VV Auger peak as the sample is subjected to a series of isochronal anneals in vacuum up to annealing temperature 300 $^\circ$ C. The intensity then decreases monotonically as the annealing temperature is increased to 600 $^\circ$ C. Experimental PAES results are analyzed by performing calculations of positron surface states and annihilation probabilities of surface-trapped positrons with relevant core electrons taking into account the charge redistribution at the surface and surface reconstruction. The effects of oxygen adsorption and defects on localization of the positron surface state wave function and positron annihilation characteristics are also analyzed. Possible explanations are provided for the observed behavior of the intensity of the positron annihilation induced Cu M2,3VV Auger peak with changes of the annealing temperature.

Nail Fazleev
University of Texas at Arlington

Date submitted: 01 Oct 2007 Electronic form version 1.4