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Studies of the oxidized Cu(100) surface using positron annihilation induced Auger electron spectroscopy W. MADDOX, N. G. FAZLEEV, M. P. NADESALINGAM, A. H. WEISS, Department of Physics, University of Texas at Arlington — We discuss recent progress in studies of an oxidized Cu(100) single crystal subjected to vacuum annealing over a temperature range from 293K to 1073K using positron annihilation induced Auger electron spectroscopy (PAES). The PAES measurements show a large monotonic increase in the intensity of the positron annihilation induced Cu M2,3 VV Auger peak as the sample is subjected to a series of isochronal anneals in vacuum up to annealing temperature 573 K. The intensity then decreases monotonically as the annealing temperature is increased to 873 K. 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, surface reconstructions, and electron-positron correlations effects. The effects of oxygen adsorption and surface reconstruction on localization of positron surface state wave functions and annihilation characteristics are analyzed. Possible explanations are provided for the observed behavior of the intensity of positron annihilation induced Cu M2,3VV Auger peak with changes of the annealing temperature.

Nail G. Fazleev
Department of Physics, University of Texas at Arlington

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