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Studies of oxidation and thermal reduction of the Cu(100) surface using low energy positrons N.G. FAZLEEV, W.B. MADDOX, A.H. WEISS, Physics Department, University of Texas at Arlington — Changes in the surface of an oxidized Cu(100) single crystal resulting from vacuum annealing have been investigated 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 $\sim$600 $^{\circ}$C. In contrast, the O KLL PAES intensity is the lowest at 300 $^{\circ}$C and it starts to increase again as the temperature is increased further. PAES results are analyzed by performing calculations of positron surface states and annihilation characteristics taking into account the charge redistribution at the surface, surface reconstructions, and changes of electronic properties of the surfaces with adsorbed oxygen. Possible explanation is proposed for the observed behavior of the intensity of positron annihilation induced Cu M2,3VV and O KLL Auger peaks and probabilities of annihilation of surface trapped positrons with Cu 3p and O 1s core-level electrons with changes of the annealing temperature.

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