

**Session: Phases of Oxygen on Cu(100) Imaged by Low Energy
SS3-FrM9 Electron Microscopy**

**Abstract #
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Abstract:

Low energy electron microscopy (LEEM) was used to perform a detailed study of three phases of oxygen on the Cu(100) surface, including two new phases. These phases occurred when the sample was heated above 600°C. Dark field imaging was used to identify regions corresponding to particular low energy electron diffraction (LEED) patterns. The structure of the steps was also examined in the LEEM images of the different phases. At low coverage, the familiar $(\sqrt{2}\times\sqrt{2})R45^\circ$ structure was observed. When annealed to 600°C, the steps changed from being gently curving to being highly bunched and completely straight with 90° kinks, resulting from a disorder-order transition. At higher oxygen coverage, <1.8ML, a new, complicated LEED pattern emerged, consisting of the $(\sqrt{2}\times\sqrt{2})R45^\circ$ pattern plus a centered rectangular structure. Images of this surface included decoration of step edges and bright, sometimes hatched, areas on the terraces. Distinct bunching of steps, which curved gently over many microns, occurred. At higher coverage, <3.2ML, another new LEED pattern occurred. The "12-spot" hexagonal pattern corresponds to a hexagonal phase with two domains. The lattice constant of this structure agrees well with that for Cu₂O, suggesting that this phase corresponds to multilayers of cuprous oxide. LEEM imaging was used to follow structural transitions among the three phases.

Note: Requested an Oral Session.