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STRUCTURE OF ELECTROCHEMICALLY DEPOSITED COPPER ON GOLD (III)

by

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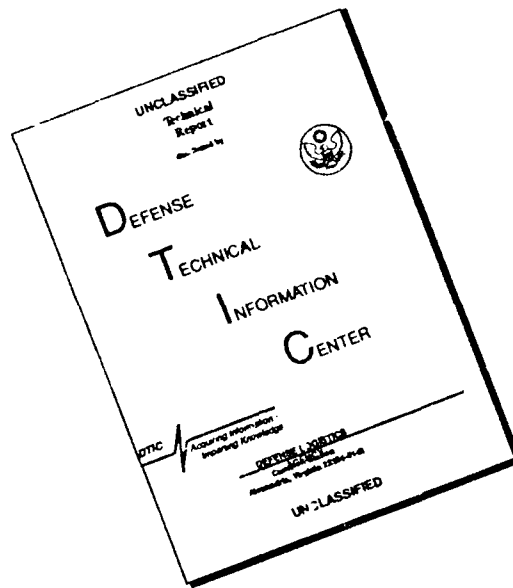
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We measured the X-ray absorption spectrum from a half monolayer (as determined from the deposition charge) of Cu deposited on Au(III) in a sulfuric acid solution. The measurements were performed in situ, with the gold electrode immersed in solution, and at controlled potential. The exciting X-rays were incident at grazing angle and the spectrum was detected by measuring the fluorescence from the monolayer with an energy dispersive IIPGe detector. Spectra were obtained with the electric vector of the X-rays both perpendicular and parallel to the sample surface.				
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1. Upstream ^{and} X17 transport pipe
2. Down stream end X17 transport pipe
3. transport pipe
4. Bremsstrahlung shield

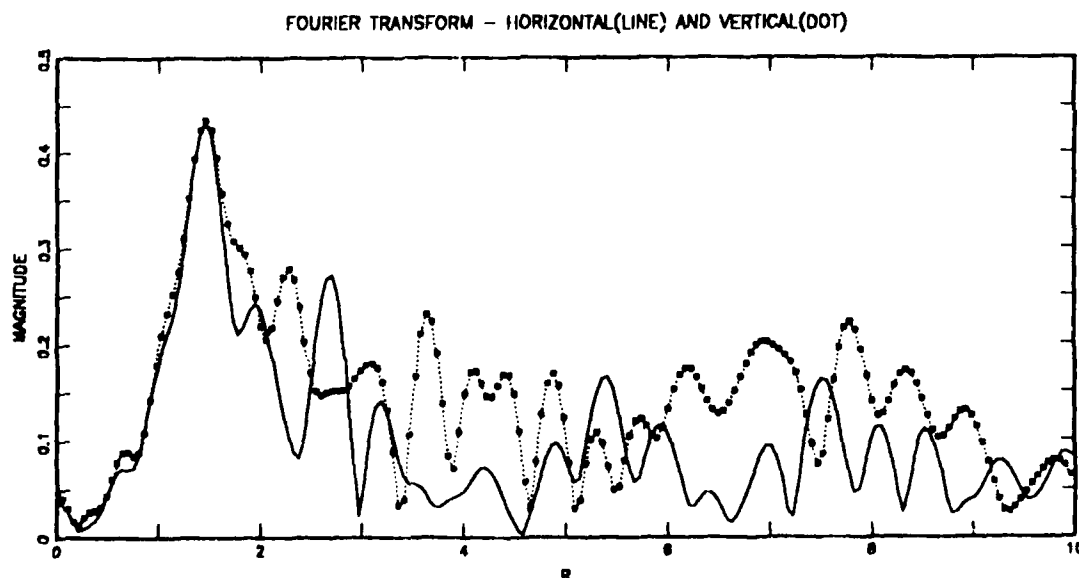
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STRUCTURE OF ELECTROCHEMICALLY DEPOSITED COPPER ON GOLD(111)

J. G. Gordon, L.-S. Kau, M. G. Samant (IBM) and L. Blum (U. Puerto Rico)

We measured the X-ray absorption spectrum from a half monolayer (as determined from the the deposition charge) of Cu deposited on Au(111) in a sulfuric acid solution. The measurements were performed in situ, with the gold electrode immersed in solution, and at controlled potential. The exciting x-rays were incident at grazing angle and the spectrum was detected by measuring the fluorescence from the monolayer with an energy dispersive HPGe detector. Spectra were obtained with the electric vector of the x-rays both perpendicular and parallel to the sample surface.

The local structure around the Cu site is complex, as can be seen from the figure. There are four shells in the Fourier transform of the EXAFS for the horizontal orientation, and three shells for the vertical one, and we have not been able to define a unique geometry based on this data. The X-ray absorption pre-edge feature around 8984-8986 eV region suggests the adsorbed Cu is not Cu(0), but is more likely Cu(I). Furthermore, a quantitative comparison of the edge jump of the fluorescence intensity from the submonolayer with that from the complete monolayer suggests that we have deposited not .5 Cu (as the electrochemical charge indicates) for every Au atom in the surface, but .7 Cu for every Au atom. These two observations are at variance with the electrochemical data and probably mean that there is extensive anion co-adsorption.



Radial structure function of half monolayer of Cu on Au(111).
Solid line - parallel polarization. Dotted line - perpendicular polarization.

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