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In situ TEM Studies of the Initial Oxidation stage of Cu and Cu Alloy Thin Films JUDITH YANG, YIHONG KANG, University of Pittsburgh, LANGLI LUO, State University of New York at Binghamton, JAMES CISTON, Lawrence Berkeley National Laboratory, ERIC STACH, Brookhaven National Laboratory, GUANGWEN ZHOU, State University of New York at Binghamton — The fundamental understanding of oxidation at the nanoscale is important for the environmental stability of coating materials as well as processing of oxide nanostructures. Our previous studies show the epitaxial growth of Cu_2O islands during the initial stages of oxidation of Cu thin films, where surface diffusion and strain impact the oxide development and morphologies. The addition of secondary elements changes the oxidation mechanism. If the secondary element is non-oxidizing, such as Au, it will limit the Cu_2O island growth due to the depletion of Cu near the oxide islands. When the secondary element is oxidizing, for example Ni, the alloy will show more complex behaviour, where duplex oxide islands were observed. Nucleation density and growth rate of oxide islands are observed under various temperatures and oxygen partial pressures (pO_2) as a function of time by *in situ* ultra high vacuum (UHV)-transmission electron microscopy (TEM). Our initial results of Cu-Ni(001) oxidation is that the oxide epitaxy and morphologies change as function of Ni concentration. For higher spatial resolution, we are examining the atomic scale oxidation by aberration-corrected ETEM with 1Å resolution.

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