On the stability of copper overlayers on Au(1 1 1) and Au(1 0 0) electrodes under low potential conditions and in the presence on CO and CO2

We have studied the stability of Cu overlayers on Au(1 1 1) and Au(1 0 0) electrodes under low potential conditions and in the presence of CO and CO2 by means of electrochemical STM (EC-STM). For preparation we utilized the well known underpotential deposition (UPD) of copper, which, depending on the electrolyte (HClO4 and H2SO4), leads to Cu coverages in the submonolayer to monolayer range. For a Cu submonolayer on Au(1 1 1) we found that independent from the actual gas coadsorbate its closed film-like structure collapses at low potentials due to the desorption of coadsorbed anions. In contrast we found for a full Cu monolayer on Au(1 1 1) and Au(1 0 0) the formation of an alloy phase under low potential conditions, which also occurs independent from the presence of gas coadsorbates.