Electrochemical Interfaces Observed on the Atomic Scale

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X-ray techniques offer unique possibilities to study surfaces in liquid environment. Several groups have performed X-ray diffraction experiments at ID32, ESRF, aimed at resolving the atomic structure of electro-deposited materials, following epitaxial growth, or analysing the dynamics of deposition and oxidation processes. One of our own particular interests is to gain a deeper understanding of the initial electrochemical corrosion of alloy crystals. Basically all technically relevant metals are alloys. While corrosion is here on the one hand a common detrimental problem it can on the other hand be used to produce nano-porous layers with possible applications in catalysis or sensor technology. We studied systematically the corrosive dealloying of Cu3Au crystals as a function of potential. Using in situ surface X-ray diffraction we obtained detailed information about the atomic structure of metallic passivation layers formed by the selective dissolution of Cu from the surface. We could follow the initial growth of an ultra-thin Au-rich layer on Cu3Au(111) and its evolution to pure Au islands at elevated potentials. Also first results of a corrosion study of Cu3Au(001) will be presented