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Composition of CuAu alloy and changes upon corrosion studied by Hard X-ray Photoelectron Spectroscopy PARASMANI RAJPUT, BLANKA DETLEFS, ESRF, Grenoble, France, AJAY GUPTA, UGC-DAE Consortium for scientific research, Indore 452017, India, DIETER KOLB, University Ulm, Germany, JORG ZEGENHAGEN, ESRF, Grenoble, France — Metals and their alloys are highly susceptible to corrosion in wet environment. Dealloying is a particular type of corrosion, attacking practically all metals in industrial use: When an alloy is coming into contact with an electrolyte, the less noble metal may go into solution, typically causing crack formation and subsequent material failure upon stress. We used bulk sensitive Hard X-ray photoelectron spectroscopy (HAXPES) with an excitation energy of 6 keV as a new powerful tool to investigate the chemical composition of alloys and changes upon dealloying, studying Cu_xAu (with x = 4.1) alloy films of 9 to 50 nm thickness. Morphology, structure and composition were further characterized by atomic force microscopy, X-ray reflectivity and quantitative X-ray fluorescence. The HAXPES analysis revealed that chemical shifts of metal core-levels, i.e. Au4f and Cu3s, can be used as a benchmark for the alloy composition. HAXPES as a function of electron emission angle allowed depth sensitive determination of the chemical composition before and after dealloying in sulphuric acid.

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