IN-SITU OXIDATION STUDIES OF ALLOY SURFACES AND NANOPARTICLES FROM UHV TO ATMOSPHERIC PRESSURES

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The oxidation of metal and binary alloy surfaces attracted a lot of interest in the past because of its relevance for corrosion protection and formation of ultrathin planar oxide films with applications as model catalyst support or tunneling barriers. For alloys often selective oxidation of the less noble component takes place, leaving behind a near surface region enriched in the more noble component. The kinetics of planar oxide film growth is governed by different processes, which I will highlight in my talk for the case of NiAl, Fe3Al and CoGa surfaces, which we investigated by surface sensitive x-ray diffraction methods [1,2]. I will especially address the role of the oxygen pressure in overcoming kinetic barriers during the formation of thicker oxide films [3,4]. In the second part of my talk I will discuss the oxidation behavior of metal and alloy nanoparticles, which is relevant for heterogeneous catalytic reactions involving 4d transition metal nanoparticles. Only recently approaches for modeling the oxidation kinetics of nanoparticles were presented, which lack thorough experimental verification. I will demonstrate how the novel technique of high energy grazing incidence x-ray diffraction allows in a unique way to address the oxidation kinetics of nanoparticles in the sub 10 nm regime [5,6].

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