

Abstract Submitted
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The band gap of ultra-thin amorphous and well-ordered Al₂O₃ films on CoAl(100)¹ VOLKER ROSE, Argonne National Laboratory, RENE FRANCHY², Research Center Julich — Understanding the insulating properties of thin oxide films is key to developing novel devices. In this work, the band gaps of ultra-thin amorphous and well-ordered alumina films on CoAl(100) were investigated by means of scanning tunneling spectroscopy (STS). The ordered intermetallic alloy CoAl(100) exhibits a magnetic surface, although the bulk is nonmagnetic. Such a material is extremely attractive for innovative technical applications. Utilizing selective oxidation, by which the oxidation of CoAl leads to surface segregation of the element with higher oxygen affinity, thin high-quality Al₂O₃ films are formed. Oxidation at 300 K leads to the growth of amorphous oxide, while well-ordered films result at elevated temperatures. In both cases, the self-limiting thickness of the oxide film amounts to around 1 nm. The analysis yields band gaps of 2.8 and 3.6 eV for amorphous and well-ordered Al₂O₃, respectively. The with respect to the bulk oxide reduced band gap can be explained by the appearance of defect induced states localized in the band gap.

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