Band bending and alignment at the spinel/perovskite γ-Al2O3/SrTiO3 heterointerface - DTU Orbit (21/12/2018)

**Band bending and alignment at the spinel/perovskite γ-Al2O3/SrTiO3 heterointerface**

We present a comprehensive study of the band bending and alignment at the interface of γ-Al2O3/SrTiO3 heterostructures by hard x-ray photoelectron spectroscopy. Our measurements find no signs for a potential gradient within the polar γ-Al2O3 film as predicted by the basic electronic reconstruction scenario. We present evidence for a band bending on the SrTiO3 side of the interface, yielding a roughly 600 meV deep potential trough, which reaches below the chemical potential and has a spatial expansion of 3–5 unit cells. The band offset between the bulk valence bands is determined to be also approximately 600 meV, corresponding to aligned bands at the interface. Finally, the spatial confinement of the interfacial two-dimensional electron system is derived from the chemically shifted Ti3+ photoemission signal in the Ti 2p core level spectra, measured at various photoelectron detection angles. It is found to be in excellent agreement with the spatial depth of the potential trough.

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