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Thin ZrO₂ films: Surface and electronic structure of insulators

Although the applications of zirconia (ZrO₂) are manifold, its surface has not yet been studied thoroughly on an atomic level. This has a simple reason: ZrO₂ is non-conductive, which makes the study of bulk zirconia with typical surface-science methods impracticable. To circumvent this issue, we searched for thin-film model systems, starting with single-monolayer films which exhibit a structure strongly dependent on the substrate below. When going to several-monolayer-thick films, deposited with home-built sputter source, surface structures influenced by the substrate are encountered up to four monolayers thickness. The best model system was found at a thickness of five monolayers. There, both the tetragonal and the monoclinic structure of ZrO₂ can be prepared, and the films can be still studied with high-resolution scanning tunneling microscopy. The surface structure and electronic structure of these ZrO₂ thin films will be presented.

All interested colleagues are welcome to this seminar lecture (45 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Ulrike Diebold
(Seminar Chair)