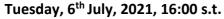


IAP Seminar



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TU Wien, Freihaus HS 6, Turm A (grün), 2.OG, Raumnummer: DA02K01 Wiedner Hauptstraße 8-10

The seminar will be also held as a Zoom Meeting

https://tuwien.zoom.us/j/96062751637?pwd=ZkRUWnlkUFFZb2pEdm55ZzFteTBNdz09

Meeting ID: 960 6275 1637 Passcode: 9ANd8XWj





Complex oxide surfaces studied at the atomic scale by non-contact AFM/STM and DFT

The majority of solid state matter naturally appears in the form of an oxide, which are highly stable in atmospheric conditions, and therefore constitute a vast research area on a broad range of their properties. I will present results obtained on two representative materials: The model binary oxide rutile $TiO_2(110)$ and the prototypical perovskite oxide $SrTiO_3(001)$ oxide. Both were studied at the atomic scale at low temperatures in ultrahigh vacuum using combined non-contact atomic force microscopy (nc-AFM) / scanning tunneling microscopy (STM) experimental setup, and the results were directly compared to density functional theory (DFT) theoretical modeling.

Rutile $TiO_2(110)$ interacts with the small O_2 [1] and CO [2] gas molecules by altering its polaronic ground state. A bulk-terminated $SrTiO_3(001)$ surface can be obtained only through ferroelectricity-assisted cleaving in ultrahigh vacuum [3,4], which proved as a promising physical system for further investigations. In addition to the underlying physics and chemistry that give rise to these phenomena, I will introduce the techniques and discuss recent advances in the applied experimental and theoretical methodologies.

[1] I. Sokolović, M. Reticcioli, et al. "Resolving the adsorption of molecular O_2 on the rutile $TiO_2(110)$ surface by noncontact atomic force microscopy." Proceedings of the National Academy of Sciences 117, 14827 (2020)

[2] M. Reticcioli, I. Sokolović, et al. "Interplay between adsorbates and polarons: CO on rutile TiO₂(110)." Physical Review Letters 122, 016805 (2019)

[3] I. Sokolović, M. Schmid, et al. "Incipient ferroelectricity: A route towards bulk-terminated SrTiO₃." Physical Review Materials **3**, 034407 (2019)

[4] I. Sokolović, G. Franceschi, et al. "Quest for a pristine unreconstructed SrTiO₃(001) surface: An atomically resolved study via noncontact atomic force microscopy." Physical Review B 103, L241406 (2021)

All interested colleagues are welcome to this seminar lecture (30 min. presentation followed by discussion).

Friedrich Aumayr (LVA-Leiter)

Ulrike Diebold (Seminar Chair)