Designing electronic phases at oxide interfaces for electronic, spintronic and energy applications

Rossitza Pentcheva

Department of Physics, University of Duisburg-Essen, Germany
E-mail: Rossitza.Pentcheva@uni-due.de

Oxide interfaces exhibit a broad spectrum of functional properties that are not available in the respective bulk compounds and open possibilities for applications in electronics, spintronics and energy conversion. Based on the insight from first principles calculations including on-site Hubbard term I will address the formation of unanticipated charge, spin and orbital reconstructions in honeycomb lattices of 3d perovskite oxides, leading to a rich set of Mott and even topological phases [1-3]. Furthermore, I will discuss the origin of remanent above room-temperature magnetization at the interface of antiferromagnetic CoO and Co_3O_4 [4]. Last but not least, I will discuss strategies for the optimization of oxide materials for thermoelectrics [5] and energy conversion.

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