Growth and magnetic properties of lowdimensional oxide films on a support: CoO/Ir(100)

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The support of epitaxial films frequently determines their crystallographic orientation, which is of crucial importance for their electronic and magnetic properties. Although the surface stress in the oxide layer is usually seen as the main driving force for its orientation, we could recently show in a combined theoretical and experimental study that the interface chemistry can play a crucial role [1]. This allows for a novel way to alter the film orientation without changing the substrate. I will present our results for the growth of CoO on the Ir(100) surface, obtained on the basis of DFT calculations with the Vienna Ab-initio Simulations Package (VASP). While the oxide grows in (111) orientation on the bare substrate, the orientation switches to (100) by introducing a single (or a few) monolayer(s) of Co between the oxide and substrate due to the enhances interaction at the interface.

In addition, I will report on the the magnetic ordering in the ultrathin hexagonal c(10$\bar{1}$2) CoO(111) film supported on Ir(100) [2]. In that case, we find a close relationship between the local structural properties of the oxide film and the induced magnetic order, leading to alternating ferromagnetically and antiferromagnetically ordered segments. While the local magnetic order is directly related to the geometric position of the Co atoms, the mismatch between the CoO film and the Ir substrate leads to a complex long-range order of the oxide.

[1] M. Gubo et al., *Phys. Rev. Lett.* **108**, 066101 (2012).
[2] F. Mittendorfer, at el., *Phys. Rev. Lett.* **109**, 015501 (2012).