Colloquium

Engineering Magnetic and Electronic Properties in Transition Metal Oxide Heterostructures

Marta Gibert
TU Wien

Host: Kimberly Modic

Atomically engineered transition-metal-oxide heterostructures provide a powerful platform to stabilize metastable phases and generate emergent properties by stacking dissimilar materials with atomic-scale precision. In this talk, we present two representative examples. First, we address the long-debated properties of SrCrO thin films. Through the growth of high-quality, strained films via magnetron sputtering, we demonstrate that SrCrO's ground state is that of a metallic antiferromagnet. A combination of muon spin relaxation, SQUID magnetometry, XMCD, and XMLD reveals an antiferromagnetic transition at a Néel temperature of approximately 150 K — about 100 K higher than in the bulk. Additionally, increasing tensile strain induces a metal-insulator transition in these films while leaving the magnetic transition unaffected. Second, we investigate structure–property relationships in ferromagnetic double-perovskite LaNiMnO thin films as their thickness is reduced to a few unit cells [1]. Using atomically controlled LaNiMnO/RENiMnO (RE = Nd, Sm) superlattices, we probe the length scale of interfacial coupling between ferromagnetic and paramagnetic layers and show that the magnetic transition temperature can be tuned via superlattice periodicity [2]. Finally, we demonstrate that these superlattices enable the rational design of antipolar distortions, paving the way for multiferroicity in artificially layered oxide systems [3]. [1] G. De Luca et al., Advanced Materials 34, 2203071 (2022) [2] J. Spring et al., ACS Nano 19, 14652 (2025) [3] J. Spring et al., Advanced Materials (accepted)

Tuesday, January 20, 2026 11:00am - 12:00pm
Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
Please find a schedule of the ISTA Shuttle on our webpage:
https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.