**Controlling the behavior of complex oxides via epitaxial constraints: polymorphic phase transitions and octahedral tilts**

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Numerous recent studies have shown that epitaxial constraints influence complex oxide materials in a much more intricate fashion than what would be expected from mere Poisson-like deformations. In this talk, I will illustrate two examples of materials modifications in epitaxial structures. In the case of $BiFeO_3$ films, stress resulting from film-substrate lattice mismatch results in a well-studied polymorphic phase transformation from a bulk-like (R') phase to a highly axial (T') structure. We investigate T' $BiFeO_3$ films as a function of temperature by x-ray diffraction, neutron scattering, and Raman spectroscopy, in combination with synchrotron microbeam diffraction, as well as atomic-force, piezo-response force, and transmission electron microscopies. The coexistence of the T' majority phase (where $c/a \approx 1.25$) with an intermediary S' polymorph ($c/a \approx 1.09$) leads to the formation of stripe patterns that are stabilized by thermal strain, but a true tetragonal (yet polar) phase is found at high temperature. Interestingly, piezoelectric switching requires the presence of the intermediary polymorph and is thus impossible at higher temperatures. In a second part of the talk, I will discuss results from $SrTiO_3/LaMnO_3$ interfaces and superlattices. Polarized neutron reflectometry shows that these interfaces are magnetic (approaching 3 $\mu_B$/Mn) despite the fact that Mn retains a 3+ valence state. Visualizing the octahedral tilts by annular bright-field scanning transmission electron microscopy demonstrates the short-range structural origin of this magnetization, distinct from the long-range uniform epitaxial strain.

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