"The (even more) complex surfaces of complex perovskite oxides: curse and opportunity"

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Perovskite oxides, chemical formula ABO_3, are known to sensitively change their properties depending on their composition. This makes these materials both highly tunable but also sometimes difficult to control. From the few surface science studies on perovskite oxides that exist so far it has become evident, that this is true - even more so - for their surfaces: even for one specific bulk composition, the surface structure changes dramatically depending on small changes in surface stoichiometry.

The talk will describe how the A:B ratio and the oxygen chemical potential affect the surface properties of two materials, $SrTiO_3$(110) [1,2] and $La_{0.8}Sr_{0.2}MnO_3$(110) [3,4]. The work builds on an apparatus that combines state-of-the-art pulsed laser deposition with epitaxial control with in-situ surface characterization techniques [5], and on quantitatively determining the cation stoichiometry [6]. Based on a previously-determined, phase diagram of $SrTiO_3$(110) [7], we can determine the non-stoichiometries introduced by PLD with very high precision [1], and we show how even small changes in the Sr:Ti ratio affect the morphology of the grown films [2]. This knowledge is then used to establish the appropriate growth procedures for $La_{0.8}Sr_{0.2}MnO_3$(110) [3], and helps with establishing a two-dimensional phase diagram of the rich structural variety of this material [4].

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