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Tracking BO_6 Coupling in Perovskite Superlattices to Engineer Magnetic Interface Behavior[1] ALBINA BORISEVICH, Oak Ridge National Lab, QIAN HE, University of Cardiff, SAURABH GHOSH, Vanderbilt University, EUN JU MOON, STEVE MAY, Drexel University, ANDREW LUPINI, Oak Ridge National Lab, SOKRATES PANTELIDES, Vanderbilt University — In the past several years, control of BO_6 octahedral coupling at ABO_3 perovskite interfaces has emerged as a new tool for engineering of interface properties due to its strong coupling to polar and magnetic properties. High resolution data on tilt transitions at interfaces is instrumental for evaluating the validity of existing theoretical models and developing predictive theories. Recently, we have developed a unique method to investigate BO_6 rotation patterns in complex oxides with unit cell resolution. Our method involves column shape analysis in ABF-STEM images of the perovskite heterointerfaces taken in specific orientations. This method will allow us to determine local symmetry between adjacent unit cells, revealing the BO_6 coupling behavior at heterointerfaces in 3D. This technique was used to characterize structure and predict properties via a combined STEM and DFT study of magnetic superlattice of $La(Ca)MnO_3/La(Sr)MnO_3$ with different periodicities, which exhibit a range of electromagnetic coupling behaviors. We will also discuss the prospects for tilted structure determination using electron ptychography. The correlations among the BO_6 rotation, domain size, superlattice periodicity and the electromagnetic coupling will be discussed in detail.

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Albina Borisevich
Oak Ridge National Lab

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