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Studies of local polarization in complex oxide multiferroic interfaces by aberration corrected STEM-EELS[1] GABRIEL SANCHEZ-SANTOLINO, JAVIER TORNOS, CARLOS LEON, Universidad Complutense de Madrid, MARÍA VARELA, Oak Ridge National Laboratory and Universidad Complutense de Madrid, STEPHEN J. PENNYCOOK, Oak Ridge National Laboratory, JACOBO SANTAMARÍA, Universidad Complutense de Madrid — Interfaces in complex oxide heterostructures are responsible for exciting new physics, which is directly related to the chemical, structural and electronic properties at the atomic scale. Here, we study artificial multiferroic heterostructures combining ferromagnetic $La_{0.7}Sr_{0.3}MnO_3$ with ferroelectric $BaTiO_3$ by atomic resolution aberration-corrected scanning transmission electron microscopy (STEM) and electron energy-loss spectroscopy. Measurements of the atomic positions in the STEM images permit calculating relative displacements and hence, local polarization. Polarization gradients can be observed in annular bright field images which seem to be correlated to strain gradients associated with the large lattice mismatch between barriers and electrodes. Spectroscopic measurements suggest the presence of O vacancies through the ferroelectric layers. Understanding the effect of the charge carriers associated with the oxygen vacancies may be the key to control the dynamics of domain walls in these heterostructures.

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