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Ferroelectric-Antiferroelectric Phase Control: Interplay Between Octahedral Tilt, Polarization, and Chemistry at BFO-LSMO Interfaces¹ YOUNG-MIN KIM, Oak Ridge National Laboratory, PU YU, University of California Berkeley, YING-HAO CHU, National Chiao Tung University, STEPHEN PENNYCOOK, SERGEI KALININ, ALBINA BORISEVICH, Oak Ridge National Laboratory — Atomically-defined interfaces between complex oxides offer a paradigm of novel electronic and coupled functionalities. Here, we report the stabilization of the ferroelectric and antiferroelectric phases at the BFO-LSMO interface though termination control and reveal associated atomic-scale mechanisms with the help of aberration-corrected scanning transmission electron microscopy combined with Electron Energy Loss Spectroscopy. The BFO thin film grown on MnO₂-terminated surface of LSMO exhibits stabilized ferroelectric phase at the interface. The interfacial and bulk polarization are antiparallel, giving rise to head to head ferroelectric domain wall mostly parallel to the interface. In comparison, the film grown on (Sr,La)O-terminated surface of LSMO exhibits antiferroelectric phase in the vicinity of the interface, with associated ferroelectric-antiferroelectric domain wall in the bulk. Details of tilt and polarization behavior, as well as electronic properties at the interfaces including charged domain walls and FE-AFE walls, will be presented. These results imply that the structural parameters such as octahedral tilt and ferroelectricity in BFO can be directly controlled by modifying the interface structure.

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