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Atomic-Scale Tunneling Spectra across $BiFeO_3/La_{0.7}Sr_{0.3}MnO_3$ Heterointerfaces YA-PING CHIU[1], Department of Physics, National Taiwan Normal University, Taipei, 116, Taiwan, BO-CHAO HUANG, Institute of Physics, Academia Sinica, Taipei 105, Taiwan, PU YU[2], State Key Laboratory of Low-Dimensional Quantum Physics, Department of Physics, Tsinghua University, CHIA-SENG CHANG, YING-HAO CHU[3], Institute of Physics, Academia Sinica, Taipei 105, Taiwan — Atomic-level evolution of electronic structures across $BiFeO_3/La_{0.7}Sr_{0.3}MnO_3$ complex oxide heterointerfaces has been demonstrated by cross-sectional scanning tunneling microscopy and spectroscopy in this work. Analysis of scanning tunneling spectroscopy results exploits how the change in the terminated interface brings the influence to the electrostatic configurations across the $BiFeO_3/La_{0.7}Sr_{0.3}MnO_3$ heterointerfaces. Spatially unit-cell-by-unit-cell resolved electronic states at the atomic level reveal that the control of material interfaces at the atomic level determines the ferroelectric polarization in $BiFeO_3$. The precise electronic information therefore provides a clear realization about the electronic state at these complex-oxide heterointerfaces, which is crucial to understand and design a host of novel functionalities at complex oxide heterointerfaces.

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