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Scanning tunneling microscopy investigation of the electronic structure across $\text{LaAlO}_3/\text{SrTiO}_3$ heterointerfaces YA-PING CHIU, BO-CHAO HUANG, Department of Physics, National Sun Yat-sen University, JAN-CHI YANG, YING-HAO CHU, Department of Materials Science and Engineering, National Chiao Tung University — Atomically controlled polarity discontinuities induced unusual charge states have been found in the model interface between two insulating perovskite oxides, LaAlO_3 and SrTiO_3 . In this work, by using cross-sectional scanning tunneling microscopy, local and direct evidence of nontrivial local structural and electronic information across the heterointerfaces are investigated. A combination of scanning tunneling spectroscopy analysis with atomic resolution across the $\text{LaAlO}_3/\text{SrTiO}_3$ heterointerface reveals how the oppositely charged atomic planes undergo electronic reconstructions and introduce a built-in electric field across the polar LaAlO_3 thin films grown on SrTiO_3 substrates. Further analysis of the related electronic and geometrical properties not only realizes the properties both in bands of electron and hole characters across the $\text{LaAlO}_3/\text{SrTiO}_3$ heterointerfaces but also helps to elucidate the mechanism of the interface conductivity.

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