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Direct observations of the band alignment of LaAlO3/SrTiO3 using scanning tunneling microscopy Y.P. CHIU, B.C. HUANG, P.C. HUANG, Department of Physics, National Sun Yat-sen University, Kaohsiung, 804, Taiwan, V.T. TRA, J.Y. LIN, Institute of Physics, National Chiao Tung University, Hsinchu, 300, Taiwan, J.C. YANG, Y.H. CHU, Department of Materials Science and Engineering, National Chiao Tung University, HsinChu, 300, Taiwan — In this work, by using cross-sectional scanning tunneling microscopy, local and direct evidence of the electronic information across the LaAlO3/SrTiO3 hetero-interfaces are investigated. A combination of scanning tunneling spectroscopy and analysis with atomic resolution across the hetero-interface reveals how the oppositely charged atomic planes undergo electronic reconstructions and introduce a built-in electric field across the polar LaAlO3 thin films grown on SrTiO3 substrates. With the consideration of the tip-induced band bending effect, the magnitude of the built-in field across LaAlO3, the band bending on SrTiO3 side, and the decay length of the band downshift of SrTiO3 side at the hetero-interface are directly observed.

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