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Hard X-ray Photoelectron Spectroscopy Investigation of Off-Stoichiometric LaAlO3 interfaces with $SrTiO_3$ CONAN WEILAND, National Institute of Standards and Technology, GEORGE E. STERBINSKY, ABDUL K. RUMAIZ, National Synchrotron Light Source, Brookhaven National Lab, JOSEPH C. WOICIK, National Institute of Standards and Technology, C. STEPHEN HELLBERG, Center for Computational Materials Science, Naval Research Laboratory, SHAOBO ZHU, DARREL G. SCHLOM, Department of Materials Science and Engineering, Cornell University — $LaAlO_3$ (LAO) and $SrTiO_3$ (STO) are both insulators, yet the interface between TiO_2-terminated STO and LAO is a high mobility conductor when the LAO film is above a critical thickness. The origin of this conductivity is under debate; possible explanations for conductive interfaces include chemical intermixing, oxygen defects, and charge redistribution arising from the built-in potential due to the polar LAO layers on the non-polar STO surface. Recently, interfacial conductivity has been found to depend on the stoichiometry of the LAO film, with Al-rich samples providing conductive interfaces, while stoichiometric and La-rich samples do not. Here, hard x-ray photoelectron spectroscopy (HAXPES) and variable kinetic energy XPS (VKE-XPS) have been used to investigate the interface of 10 unit cell films of La-rich, Al-rich, and stoichiometric LAO on STO.

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