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Mott behavior of ultrathin epitaxial LaNiO3 films and interfaces via hard x-ray and standing-wave excited photoemission ALEXANDER GRAY, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, ALEXANDER KAISER, Department of Physics, University of California, Davis, JUNWOO SON, ANDERSON JANOTTI, Materials Department, University of California, Santa Barbara, SEE-HUN YANG, IBM Almaden Research Center, AARON BOSTWICK, Advanced Light Source, LBNL, SHIGENORI UEDA, KEISUKE KOBAYASHI, NIMS Beamline Station at SPring-8, CHRIS VAN DE WALLE, SUSANNE STEMMER, Materials Department, University of California, Santa Barbara, CHARLES FADLEY, Department of Physics, University of California, Davis — In this study we apply several emerging x-ray photoemission techniques to study Mott behavior of ultrathin LaNiO3 films and interfaces in a depth-resolved manner. In order to understand the effects of thickness and strain on the electronic structure, we apply hard x-ray photoemission (HAXPES) at 6 keV to epitaxial LaNiO3 films of varying thickness under compressive and tensile strain. Mott metal-to-insulator transition is observed for the thinnest films. Furthermore, standing-wave-excited photoemission is used to study the electronic structure of ultrathin LaNiO3 in a SrTiO3/LaNiO3 superlattice. Standing-wave measurements of core-level and valence band spectra are used to derive layer-resolved densities of states, revealing a suppression of electronic states near the Fermi level in the multilayer as compared to bulk LaNiO3. Further analysis shows that the suppression of these states is not homogeneously distributed over the LaNiO3 layers but is more pronounced near the interfaces.

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