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Local atomic and electronic structure of LaCoO3/SrTiO3 thin films by HAADF STEM and EELS[1] ALBINA BORISEVICH, JAE HYUCK JANG, YOUNG-MIN KIM, Materials Science and Technology Division, Oak Ridge National Laboratory, LIANG QIAO, MICHAEL BIEGALSKI, Center for Nanophase Materials Scinces, Oak Ridge National Laboratory — For perovskite films with several competing functionalities, magnetic and electronic properties can be affected both by structural order parameters and chemical factors. For example, in LaCoO3 (LCO) thin films, magnetic and transport properties are strongly dependent on strain state and oxygen content. For this study, LCO thin films were deposited by pulsed laser deposition method with different thicknesses (2, 5, 15 unit cell and 20 nm thickness) on SrTiO3 substrate. X-ray photoelectron spectroscopy studies of the grown films have demonstrated that Co 3p edges shift up to 2 eV for 15 u.c. and 20 nm films, indicating possible presence of 2D electron gas. The structure of the 5 u.c and 15 u.c LCO films was examined. Atomic position mapping from STEM HAADF and BF images can reveal lattice parameter and octahedral tilt behavior with atomic resolution. BF STEM imaging showed that octahedral tilts were active in the 15 u.c. film but not in the 5 u.c. film. A complex pattern of O K fine structure evolution at the interface was observed; results of the deconvolution of different contributions to this behavior using advanced simulations, as well as data on oxygen vacancy mapping, will be presented.

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