Abstract Submitted for the MAR17 Meeting of The American Physical Society

Thickness dependent Mn valence in $La_{0.7}Sr_{0.3}MnO_3$ thin films¹ ROBBYN TRAPPEN, Department of Physics and Astronomy, West Virginia University, WV 26506, USA, VU THANH TRA, Institute of Physics, National Chiao Tung University, 30010 HsinChu, Taiwan, CHIH-YEH HUANG, JINLING ZHOU, GUERAU CABRERA, Department of Physics and Astronomy, West Virginia University, WV 26506, USA, YING-HAO CHU, Institute of Physics, National Chiao Tung University, 30010 HsinChu, Taiwan, SHUAI DONG, Department of Physics, Southeast University, Nanjing 211189, China, MIKEL HOLCOMB, Department of Physics and Astronomy, West Virginia University, WV 26506, USA — The Mn valence in thin film $La_{0.7}Sr_{0.3}MnO_3$ is studied as a function of film thickness in the range of 1-16u.c. Using a combination of bulk and surface sensitive x-ray absorption spectroscopy techniques, the layer-by-layer Mn valence is determined for these film thicknesses. It is found that while the bulk averaged valence hovers around its expected value of 3.3, a significant deviation occurs within several unit cells of the surface and interface, where the surface and interface valence are determined to be 4 and 2.68, respectively. These results are supported by theoretical calculations. The change in valence from the expected bulk value arises from the polar discontinuity at the film-substrate interface.

¹NSF (DMR-1608656), U.S. Department of Energy DE-SC0016176, US Department of Energy DE-AC02-05CH, National Natural Science Foundation of China (No. 11274060)

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Date submitted: 08 Nov 2016

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