Abstract Submitted
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Atomic Resolution Valence Mapping in LuFe2O4 in an Aberration Corrected STEM[1] J.A. MUNDY, Cornell University, C.M. BROOKS, R. MISRA, P. SCHIFFER, Pennsylvania State University, D.A. MULLER, D.G. SCHLOM, Cornell University — LuFe2O4 is a multiferroic with the simultaneous existence of ferroelectricity and ferrimagnetism at the highest temperature of any known material. The improper ferroelectricity is attributed to charge ordering in the Fe-O layers, however, a direct measure of the Fe valence on individual columns in the crystal remains elusive. Scanning Transmission Electron Microscopy (STEM) in combination with Electron Energy Loss Spectroscopy (EELS) allows for spatially resolved, chemically sensitive investigation of oxide materials. We used a Nion 5th-order aberration corrected 100 keV dedicated STEM to collect spectroscopic images from a thin film of LuFe2O4 on MgAl2O4 to map the two-dimensional concentrations of every atomic species in the film. The Fe valence on individual columns was measured, however, no statistically significant modulation–as would be consistent with charge ordering–was observed. Finally, changes in the fine structure in the EELS O atoms in the Lu-O and Fe-O planes, was mapped in two-dimensions.

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