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Intrinsic magnetic properties of multiferroic h-LuFeO3 JARRETT MOYER, Dept of Physics and MRL, Univ of Illinois, RAJIV MISRA, Dept of Physics, Penn State Univ, JULIA MUNDY, School of Applied and Engineering Physics, Cornell Univ, CHARLES BROOKS, JOHN HERON, Dept of Materials Science and Engineering, Cornell Univ, DAVID MULLER, School of Applied and Engineering Physics and Kavli Institute for Nanoscience, Cornell Univ, DARRELL SCHLOM, Dept of Materials Science and Engineering and Kavli Institute for Nanoscience, Cornell Univ, PETER SCHIFFER, Dept of Physics and MRL, Univ of Illinois — The discovery of multiferroic materials with large magnetoelectrical couplings would lead to significant advancements in many technologies. Hexagonal $LuFeO_3$ (h-$LuFeO_3$) is a multiferroic that has recently been reported to be multiferroic at room temperature; in this work, we grow 200 nm thick h-$LuFeO_3$ thin films to determine its intrinsic magnetic properties. We first deposit h-$LuFeO_3$ in a composition-spread geometry, creating samples that range from iron rich to lutetium rich. We use x-ray diffraction, atomic force microscopy, scanning transmission electron microscopy, and SQUID magnetometry to determine the region of the sample that is nearest to perfect stoichiometry. After identifying this region, we grow an additional sample with a rotating sample stage to ensure uniform composition throughout the sample. We determine the magnetic properties to be quite different from previously reported findings, most notably with a higher T_N =147 K. Our findings show that it is easy for h-$LuFeO_3$ to incorporate defects and impurities phases, leading to degraded magnetic properties compared to the stoichiometric phase.

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