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Magnetic properties of epitaxial hexagonal $HoFeO_3$ thin films[1]
XIAO WANG, ZHUYUN XIAO, Bryn Mawr College, XIAOSHAN XU, Bryn Mawr College, University of Nebraska Lincoln, WENBIN WANG, Fudan University, DAVID KEAVNEY, YAOHUA LIU, Argonne National Laboratory, X.M. CHENG, Bryn Mawr College — Multiferroic materials exhibit multiple ferroic orders simultaneously and thus have great potential applications in information technology, sensing and actuation. Epitaxial hexagonal $HoFeO_3$ (h-HFO) films are very promising candidates as multiferroic materials with room temperature ferromagnetism, because magnetic Ho^{3+} ions are expected to have stronger exchange interactions with Fe^{3+} ions than the well-studied h-$LuFeO_3$ films. We report study of magnetic properties of epitaxial h-HFO thin films deposited using laser molecular beam epitaxy on Yttria-stabilized zirconia (YSZ) substrates. X-ray diffraction measurements confirmed the epitaxial registry and six-fold symmetry of the film. Temperature dependence of magnetization of the film measured by a Quantum Design SQUID magnetometer shows dominating paramagnetic characteristic. Element specific x-ray magnetic circular dichroism measurements performed at beamline 4-ID-C of the Advanced Photon Source show a ferromagnetic ordering of Fe and an exchange coupling between Ho^{3+} and Fe^{3+} ions.

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