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X-ray Magnetic circular dichroism study of hexagonal $YbFeO_3$ thin films XIAO WANG, Bryn Mawr College, KISHAN SINHA, XIAOSHAN XU, University of NebraskaLincoln, YAOHUA LIU, Oak Ridge National Laboratory, DAVID KEAVNEY, Argonne National Laboratory, X.M. CHENG, Bryn Mawr College — Multiferroic materials exhibit multiple ferroic orders simultaneously and thus have potential applications in information technology, sensing, and actuation. Hexagonal $YbFeO_3$ is a promising candidate for a multiferroic material with room temperature ferromagnetism because of the expected enhanced Fe moment and higher transition temperature due to the exchange interaction between magnetic Yb and Fe ions. Here we report an x-ray magnetic circular dichroism (XMCD) study of (0001) Hexagonal $YbFO_3$ thin films deposited on (111) yttria-stabilized zirconia substrates via pulsed laser deposition. XMCD spectra for the Fe $L_{2,3}$ edges and Yb M_5 edge were measured with the magnetic field applied parallel to the x-ray propagation direction and 20 degree away from the film normal at beamline 4ID-C of the APS at ANL. Field dependence of the XMCD spectra show that Fe and Yb each has a ferromagnetic ordering at around 6.7 K but with opposite orientations in between. The saturation magnetic moment for Fe is determined by the sum rules to be 0.07 μ_B / Fe cation at around 6.7 K, about 4 times larger than that in Hexagonal $LuFeO_3$.

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