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Magnetic properties of hexagonal $YbFeO_3$ thin film[1] KISHAN SINHA, XIN ZHANG, University of Nebraska-Lincoln, XIAO WANG, Bryn Mawr College, YAOHUA LIU, Oak Ridge National Laboratory, XUEMEI CHENG, Bryn Mawr College, ALPHA N'DIAYE, Lawrence Berkeley National Laboratory, PETER DOWBEN, XIAOSHAN XU, University of Nebraska-Lincoln — We have synthesized epitaxial single crystal thin films of multiferroic hexagonal YbFeO3 (0001) on YSZ (111) substrates using Pulsed Laser Deposition. In-plane XRD and RHEED study confirms the existence of six-fold symmetry in $YbFeO_3$ thin films, consistent with the proposed hexagonal structure. The epitaxial orientation is found to be *h*-$YbFeO_3$ (100)||YSZ(11-2). We have studied magnetic properties of *h*-$YbFeO_3$/YSZ thin films using SQUID, neutron diffraction and X-ray Circular Magnetic Dichroism (XMCD). SQUID study of *h*-$YbFeO_3$/YSZ thin films show emergence of out-of-plane magnetic moment at ˜140 K, possibly due to spin canting resulting from Dzyaloshinskii-Moriya interaction. This ferromagnetic transition is consistent with our temperature dependent neutron diffraction study where appearance of the forbidden (purely magnetic) (101) peak marks a magnetic transition around ˜150 K while the intensity of the nuclear (144) peak remains unaltered. In addition, SQUID and XMCD studies at low temperatures clearly indicate that Yb^{3+} ions carry a much lower magnetic moment than the previously reported values.

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