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Understanding Magnetism at the Isostructural Phase Boundary in Multiferroic BiFeO3 QING HE, S.-Y. YANG, R. RAMESH, Department of Physics, UC Berkeley, H.-J. LIN, National Synchrotron Radiation Research Center, C.-H. WANG, Y.-H. CHU, Department of Materials Science and Engineering, National Chiao Tung University — Recent study suggests that in $BiFeO_3$ (BFO) thin films epitaxial strain can lead to an isostructural change from distorted rhombohedral to a distorted tetragonal structure. In this work, ferromagnetic (or pyromagnetic) phase boundaries between these two phases in BFO thin films are induced from the as-grown state or by applying electric field using piezo- response force microscopy. Rhombohedral-like BFO is a G-type antiferromagnet with its easy plane in (111)-type planes. In depth density functional theory calculations suggest that tetragonal-like BFO is a C-type antiferromagnet with its easy plane in (110)-type planes. Detailed antiferromagnetic ordering of tetragonal-like BFO has been carefully studied using photo- emission electron spectroscopy with linear polarized x-rays. The isostructural phase boundary is magnetically frustrated because the transition between G-type and C-type antiferromagnetic ordering. X-ray magnetic circular dichroism is observed using photo-emission electron microscopy and spectroscopy with circular polarized x-ray.

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