Abstract Submitted
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Electric Field Controlled Magnetism in $BiFeO_3$/Ferromagnet Films[1] M. BARRY, K. LEE, Y.H. CHU, P.L. YANG, L.W. MARTIN, C.A. JENKINS, R. RAMESH, UC Berkeley, A. SCHOLL, A. DORAN, ALS/LBNL — $BiFeO_3$ is the only single phase room temperature multiferroic that is currently known. Not only does it have applications as a lead-free replacement for ferroelectric memory cells and piezoelectric sensors, but its interactions with other materials are now attracting a great deal of attention. Its multiferroic nature has potential in the field of exchange bias, where it could allow electric-field control of the ferromagnetic (FM) magnetization. In order to understand this coupling, an understanding of the magnetization in $BiFeO_3$ is necessary. X-ray linear and circular dichroism images were obtained using a high spatial resolution photoelectron emission microscope (PEEM), allowing elemental specificity and surface sensitivity. A piezoelectric force microscope (PFM) was used to map the ferroelectric state in micron-sized regions of the films, which were then probed using crystallographic measurements and temperature dependent PEEM measurements. Temperature dependent structural measurements allow decoupling of the two order parameters, ferroelectric and magnetic, contributing to the photoemission signal. Careful analysis of linear and circular dichroism images allows determination of magnetic directions in $BiFeO_3$ and FM layers.

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