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Reversible switching of magnetic easy axis in $Co/BiFeO_3$ thin film heterostructures[1] TIEREN GAO, ANBUSATHAIAH VARATHARAJAN, Department of Materials Science and Engineering, University of Maryland, College Park, MD 20424, WILLIAM RATCLIFF, NIST Center for Neutron Research, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, USA, ICHIRO TAKEUCHI, Department of Materials Science and Engineering, University of Maryland, College Park, MD 20424, UNIVERSITY OF MARYLAND TEAM, NIST COLLABORATION — We are investigating the magnetic properties of a thin Co layer deposited on top of and exchange coupled to (001) BiFeO3 (BFO) thin films. 5 nm Co layer is evaporated and patterned into 100 micron x 100 micron pads. We measure angular dependent magnetic hysteresis loop of the Co layer using the magneto-optical Kerr effect and by sweeping the direction of the external magnetic field. We find that exchange-coupled Co layer always develops a magnetic easy axis along the [100] or [010] direction of BFO. As electric field pulses are applied between the Co pad and the bottom electrode (SrRuO3), non-volatile changes in the magnetic properties are observed in the Co layer. For a particular Co/BFO configuration, application of an electric field corresponding to the ferroelectric coercive field of the BFO film switches the magnetic easy axis by 45 $^\circ$. Upon application of the opposite electric field pulse, the easy axis switches back to the original direction. Subsequent applications of the alternating electric field pulses result in repeating reversible switching between the initial easy axis direction and the 45 $^\circ$ rotated direction.

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Tieren Gao
Department of Materials Science and Engineering,
University of Maryland, College Park, MD 20424

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