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Investigation of the electrical switching of magnetization through exchange interactions with a magnetoelectric multiferroic[1] ALFRED LEE, ALEX DE LOZANNE, University of Texas at Austin, YING-HAO CHU, LANE W. MARTIN, MIKEL BARRY, QIAN ZHAN, PEI-LING YANG, KILHO LEE, Z. Q. QIU, R. RAMESH, University of California, Berkeley — The coupling between antiferromagnetic (AF) and ferromagnetic (FM) ordering at an interface between the two types of materials has been well established and provides the basis for modern day hard drives. $BiFeO_3$is a magnetoelectric multiferroic material which shows coupling between ferroelectric (FE) and AF phases. The Curie and Neél temperatures are ∼820 and 370 ° C, respectively, permitting room temperature operation. Manipulation of the FE ordering via external electric fields affects the AF ordering which in turn permits control over the magnetization of an adjacent FM material. We present the results of our investigation into the control of magnetic domains using electric fields. The object of investigation is a multilayer film of $Co_{0.9}Fe_{0.1}/BiFeO_3/SrRuO_3/SrTiO_3(001)$ patterned into islands. A magnetic force microscope is used both to image the magnetic domains and to apply the potential across the film.

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