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Electric Field Control of the Ferromagnetic CaRuO3/CaMnO3 Interface ALEXANDER GRUTTER, BRIAN KIRBY, NIST Center for Neutron Research, NIST, MATTHEW GRAY, CHARLES FLINT, Department of Materials Science and Engineering, Stanford University, YURI SUZUKI, Department of Applied Physics, Stanford University, JULIE BORCHERS, NIST Center for Neutron Research, NIST — Electric field control of magnetism has been recognized as one of the most important goals in nanoscale magnetics research. The most popular routes towards achieving magnetoelectric (ME) coupling have focused on heterostructures incorporating multiferroics or ferroelectrics. Such studies often rely on voltage induced distortion to induce strain in the magnetic film and alter the magnetic properties. However, successful attempts to induce ME coupling without multiferroicity or magnetoelasticity remain relatively rare. The ferromagnetic interface between the antiferromagnetic insulator $CaMnO_3$ and the paramagnetic metal $CaRuO_3$ is a promising candidate for direct magnetization control. This interfacial ferroagnetism is stabilized through the competition between interfacial double exchange and antiferromagnetic superexchange between adjacent Mn^{4+} so that the system is expected to be very sensitive to small changes in interfacial carrier density. Using polarized neutron reflectometry, we have probed the electric field dependence of the interfacial magnetization of $CaRuO_3$/$CaMnO_3$ bilayers deposited on $SrTiO_3$. We find that electric fields of ± 8 kV/m are sufficient to switch the interfaces from largely ferromagnetic to completely antiferromagnetic.

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