Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Cr2O3 Films for Magnetoelectric Gate Applications SEAN STUART, EDWARD SACHET, J.P. MARIA, J.E. (JACK) ROWE, North Carolina State University, MARC C. ULRICH, Army Research Office, DAN DOUGHERTY, North Carolina State University — The magnetoelectric properties of Cr2O3 have been extensively studied, including recent reports of a robust electrically switched magnetic surface state. We have identified Cr2O3 as a material whose magnetoelectric properties would enable voltage controlled switching of the exchange interaction with graphene, as in the Field Effect Transistor proposed by Semenov et al. (Appl. Phys. Lett. 91, 153105). We used pulsed laser deposition to grow thin Cr2O3 films directly on HOPG and sapphire. Atomic force microscopy for films grown on HOPG show closely packed Cr2O3 islands, with a smooth surface interrupted by grain boundaries. X-Ray Diffraction shows that the film has a (0001) texture for films grown at 650 deg. C, which is the ideal orientation for magnetoelectric gating. X-Ray photoelectron spectroscopy on incomplete films suggest strong chemical interactions between the graphite and Cr2O3. Films grown on sapphire have improved crystallinity and surface morphology, which allow for measurement of the surface magnetization by magnetic force microscopy after magneto-electric annealing.

Sean Stuart
North Carolina State University

Date submitted: 15 Nov 2013 Electronic form version 1.4