Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Magnetoelectric effect in Cr_2O_3 thin films[1] XI HE, University of Nebraska-Lincoln, YI WANG, SARBESWAR SAHOO, CHRISTIAN BINEK — Magnetoelectric materials experienced a recent revival as promising components of novel spintronic devices [1, 2, 3]. Since the magnetoelectric (ME) effect is relativistically small in traditional antiferromagnetic compounds like Cr_2O_3 (max. α_{zz} ≈4ps/m) and also cross- coupling between ferroic order parameters is typically small in the modern multiferroics, it is a challenge to electrically induce sufficient magnetization required for the envisioned device applications. A straightforward approach is to increase the electric field at constant voltage by reducing the thickness of the ME material to thin films of a few nm. Since magnetism is known to be affected by geometrical confinement thickness dependence of the ME effect in thin film $Cr_2O_3$is expected. We grow (111) textured Cr_2O_3 films with various thicknesses below 500 nm and study the ME effect for various ME annealing conditions as a function of temperature with the help of Kerr-magnetometry. [1] P. Borisov et al. Phys. Rev. Lett. **94**, 117203 (2005). [2] Ch. Binek, B.Doudin, J. Phys. Condens. Matter **17**, L39 (2005). [3] R. Ramesh and Nicola A. Spaldin 2007 *Nature Materials* **6** 21.

[1]Financial support by NSF through Career DMR-0547887 and MRSEC DMR-0213808 and the Nebraska Research Initiative is gratefully acknowledged.

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Date submitted: 27 Nov 2007 Electronic form version 1.4