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**Finite-Size Scaling Effects in Chromia thin films**[1] WILL ECHTENKAMP, XI HE, CHRISTIAN BINEK, Department of Physics and Astronomy and Nebraska Center for Materials and Nanoscience, University of Nebraska-Lincoln — Controlling magnetism by electrical means remains a key challenge in the area of spintronics. The use of magnetoelectrically active materials is one of the most promising approaches to this problem. Utilizing $Cr_2O_3$ as the magnetoelectric pinning layer in a magnetic heterostructure both temperature assisted and isothermal electrical control of exchange bias have been achieved [1,2]. Interestingly, this ME switching of exchange bias has only been achieved using bulk $Cr_2O_3$ crystals, isothermal switching of exchange bias using thin film chromia remains elusive. We investigate the origin of unusually pronounced finite-size scaling effects on the properties of $Cr_2O_3$ grown by Molecular Beam Epitaxy; in particular we focus on the different temperature dependencies of the magnetic susceptibility of bulk vs. thin film chromia, the change in Nèel temperatures, and the implications for the magneto electric properties of chromia thin films.

[1] P. Borisov et al., Phys. Rev. Lett. 94, 117203 (2005).
[2] X. He et al., Nature Mater. 9, 579 (2010).

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