

Abstract Submitted
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Magnetoelectric thin films for electrically controlled exchange bias in spintronic applications¹ XI HE, SARBESWAR SAHOO, SRINIVAS POLISETTY, YI WANG, TATHAGATA MUKHERJEE, CHRISTIAN BINEK, University of Nebraska-Lincoln — Epitaxial (111) oriented thin films of magnetoelectric (ME) Cr₂O₃ are grown by MBE. These films are the key component of Cr₂O₃(111)/(Co/Pt)₃ heterostructures allowing for electrically controlled exchange bias (EB) and novel spintronic applications [1]. Pure voltage control of magnetic configurations in TMR-type devices is proposed as an alternative to current-induced switching. Basic effects of electrically controlled EB and its ME switching are studied by magnetometry and polar Kerr rotation. Exchange coupling between the ME antiferromagnet Cr₂O₃ and the ferromagnetic CoPt multilayer gives rise to perpendicular EB. The latter is controlled by axial electric fields inducing excess magnetization at the interface which controls the EB field. Recently, the sign of the EB field has been tuned via a field cooling procedure where a Cr₂O₃(111) bulk/(Co/Pt)₃ system is exposed to either parallel or antiparallel axial magnetic and electric fields [2]. Here we study this ME switching effect in an all thin film heterostructure. [1] Ch.Binek, B.Doudin, J. Phys. Condens. Matter 17, L39 (2005). [2] P.Borisov et al., Phys. Rev. Lett. 94, 117203 (2005).

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Christian Binek
University of Nebraska-Lincoln

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