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Electrically controlled exchange bias for spintronic applications[1]
XI HE, SRINIVAS POLISETTY, CHRISTIAN BINEK, University of Nebraska-Lincoln — Electrically controlled exchange bias (EB) is proposed for novel spintronic applications [1]. Basic effects of electrically controlled EB and its magnetoelectric (ME) switching are studied in a $Cr_2O_3(111)/(Co/Pt)_3$ heterostructure. Exchange coupling between the ME antiferromagnet Cr_2O_3 and a ferromagnetic CoPt multilayer exhibits perpendicular EB. The latter is controlled by applied axial electric fields inducing excess magnetization at the interface. The enhancement of this hitherto weak tuning effect is explored when replacing ME bulk pinning systems by epitaxal thin films. Recently, the sign of the EB field has been tuned via field cooling the system in either parallel or antiparallel axial magnetic and electric fields [2].Here, the crossover from bulk to thin film ME pinning systems is studied and spintronic applications are suggested based on the electrically controlled EB. Pure voltage control of magnetic configurations of tunneling magnetoresistance spin valves is proposed as an alternative to current-induced magnetization switching. In addition we suggest an XOR operation realized in a MEally pinned giant magneto resistance structure. [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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