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Low dc leakage Cr_2O_3 thin films towards mili-volt switching of exchange bias[1] SALINPORN KITTIWATANAKUL, YUHAN WANG, University of Virginia, CONGLI SUN, PAUL VOYLES, University of Wisconsin-Madison, JIWEI LU, University of Virginia — Reactive bias target ion beam deposition (RBTIBD) was used to synthesize single phase highly textured antiferromagnetic Cr_2O_3 on Pt/sapphire substrate. The as-deposited substrate temperature and oxygen flow rate were explored to optimize the phase, crystallinity, and surface morphology of the Cr_2O_3 thin films with Neel temperature of 300 K. A very low electric leakage (3E-5 A/cm^2) in single-phase chromia films less than 10 nm thick was observed. Dielectric permittivity and loss were measured as a function of film thickness. These new results demonstrate the potential of milli-volt switching voltage for exchange bias of magnetic structures using antiferromagnetic chromia, for practical low power switching of magnetic tunnel junctions.

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