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Magnetic Properties of Epitaxial $Cr/Cr_2O_3/Cr$ Multilayers¹ TATHAGATA MUKHERJEE, SARBESWAR SAHOO, CHRISTIAN BINEK, University of Nebraska-Lincoln — We study $Cr/Cr_2O_3/Cr$ trilayer structures grown by Molecular Beam Epitaxy on (111) oriented Al₂O₃substrates. X-ray diffraction reveals perfect single crystalline (110) Cr and stoichiometric single crystalline Cr_2O_3 (111) films. Both, Cr and Cr_2O_3 order antiferromagnetically with bulk Néel temperatures of 311 and 307K, respectively. Cr is an itinerant antiferromagnet where the antiferromagnetic (AF) order establishes as an incommensurate spin density wave. Cr_2O_3 in contrast is an AF insulator with localized magnetic moments where magnetoelectric and piezomagnetic effects are both symmetry allowed. Its insulating, magnetoelectric and piezoelectric properties make Cr_2O_3 an interesting material for extrinsically controlled tunnel barriers in TMR type structures. The lattice mismatch of $\sim 1.2\%$ at the Cr - Cr₂O₃ interface creates a strong stress induced piezomagnetic moment revealed by SQUID measurements. The interaction between the piezomoment and the spin distribution at the Cr- interface gives rise to a rich scenario of magnetic proximity effects which we study by SQUID magnetometry, magneto-optical Kerr effect and electrical transport measurements.

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