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Colossal Magnetoresistance Based Tunnel Junctions with Magnetic and Nonmagnetic Insulating Barriers LISA ALLDREDGE, RAJESH CHOPDEKAR, Applied Physics, Cornell University, BRITTANY NELSON-CHEESEMAN, YURI SUZUKI, Materials Science, UC Berkeley — We have studied magnetic and nonmagnetic insulating barrier layers in magnetic tunnel junctions to understand the effect of magnetic moments in the barrier. Previously, we have demonstrated junction magnetoresistances of up to 20% at 80K in junctions with $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) and Fe_3O_4 electrodes with paramagnetic $CoCr_2O_4$ barriers. Having shown that magnetic barriers do not completely suppress JMR, we have developed thin films of nonmagnetic Mg_2TiO_4 (MTO) as well as paramagnetic $FeGa_2O_4$ (FGO) and $NiMn_2O_4$ (NMO). We have grown MTO on (110) $SrTiO_3$ with pulsed laser deposition in various atmospheres. Films grown in oxygen poorer atmospheres have lower resistivities than films grown in 7mTorr of O_2, which exhibit highly insulating behavior. FGO and NMO also exhibit very insulating behavior for a wide range of deposition conditions. Magnetization measurements of trilayers (Fe_3O_4/MTO/LSMO) show switching of the two magnetic layers at coercive fields comparable to single layers of LSMO and Fe_3O_4. We will discuss transport properties of these trilayers.

Lisa Alldredge
Applied Physics, Cornell University

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