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Electron Localization and Interface Magnetism in $CaRuO_3/CaMnO_3$ Superlattices J.W. FREELAND, Advanced Photon Source, Argonne National Lab., J. CHAKHALIAN, University of Arkansas, Fayetteville, J.J. KAVICH, Advanced Photon Source, Argonne National Lab., B. KEIMER, Max Planck Institute for Solid State Research, H.N. LEE, Oak Ridge National Lab. — We present a study of interface physics in superlattices composed of a G type anti-ferromagnetic insulator ($CaMnO_3$) and a paramagnetic metal ($CaRuO_3$). Using laser MBE, ultra-thin superlattices were grown with the structure [$CaRuO_3$(N u.c)/$CaMnO_3$(10 u.c.)]x6 on $LaAlO_3$(100) substrates. Polarized x-ray probes clearly show a large Mn magnetic moment, which is attributed to a canted anti-ferromagnetic state at the interface. The electronic state of the system was probed by current-in-plane transport measurements. Due to the large resistivity of CMO, magneto-transport measurements probe primarily the behavior of the carriers in the CRO layer, which show a non-bulk like insulating behavior that is attributed to disorder induced localization from interface scattering. Field dependence shows a large negative magneto-resistance (MR), which results from strong scattering of the carriers by Mn spins at the interface since the MR drops with increasing CRO layer thickness. Work at Argonne is supported by the U.S. Department of Energy, Office of Science, under Contract No. DE-AC02-06CH11357. JC is funded by U.S. DOD-ARO under Contract No. 0402-17291.

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