Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Universal magnetic behavior the electron-doped $SrMnO_3$ cubic perovskite S. KOLESNIK, B. DABROWSKI, O. CHMAISSEM, Department of Physics, Northern Illinois University, DeKalb, IL and Materials Science Division, Argonne National Laboratory, Argonne, IL — $SrMnO_3$ is the end member of a widely explored family of colossal magnetoresistive manganites $R_xSr_{1-x}MnO_3$ (R=rare earth elements). Low-level R^{3+} substitutions change the antiferromagnetic order from G-type in cubic $SrMnO_3$ to C-type in tetragonal $R_xSr_{1-x}MnO_3$ through first-order resistive and structural transitions. From the magnetization, transport, and neutron diffraction experiments we observe that a similar change can be induced by B-site substitutions in $SrMn_{1-x}M_xO_3$ (M=Ru^{5+},Mo^{6+}) both generating Mn^{3+} in the Mn^{4+} matrix. For both A-site and B-site substitutions, the Néel temperature is dependent on the Mn^{3+} concentration in a universal way. These observations reveal that the magnetic and electronic properties of low-level substituted $SrMnO_3$ are controlled by the band filling throughout the increasing role of local distortions of $Mn^{3+}O_6$ octahedra changing from randomly diluted to cooperative character of the entire lattice. Work at NIU was supported by the NSF (DMR-0706610) and at ANL by the U.S. DOE under contract No. DE-AC02-06CH11357.

Stanislaw Kolesnik
Department of Physics, Northern Illinois University, DeKalb, IL

Date submitted: 21 Nov 2008 Electronic form version 1.4