Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Exploring the Unusual Physical Properties near the Metal-Insulator Transition of $RNiO_3$ LUKE G. MARSHALL, JINGUANG CHENG, JIANSHI ZHOU, Texas Materials Institute, University of Texas at Austin, MARÍA JESÚS MARTÍNEZ-LOPE, JOSÉ ANTONIO ALONSO, Instituto de Ciencias de Materiales de Madrid, Consejo Superior de Investigaciones Cientificas, JOHN B. GOODENOUGH, Texas Materials Institute, University of Texas at Austin — Understanding the physical properties at the crossover from localized to itinerant electronic behavior in the transition-metal perovskite-related oxides remains a challenging problem of solid-state physics. This problem can manifest in mixed-valent compounds at this crossover to produce unusual properties such as high-T_c superconductivity in the cuprates and colossal magnetoresistance in the manganites. $RNiO_3$ (R=lanthanide) perovskites are single-valent compounds where the π-band is filled and the σ-band is $\frac{1}{4}$ filled. The electron bandwidth can be tuned by substituting different rare earth cations at the A site, so that the system provides a unique opportunity to study this crossover more simply. While the phase diagram for this compound is well known, magnetic rare earth ions prevent the study of the evolution from Pauli to Curie-Weiss paramagnetism. To account for this, we have used high-pressure synthesis to create a series of $RNiO_3$ samples (R=La, Y, Lu) and studied their magnetic and transport properties. We have also shown that the localized to itinerant crossover can also be explored by substituting Ga^{3+} for Ni^{3+} in $LaNi_{1-x}Ga_xO_3$.

Luke Marshall
Texas Materials Institute, University of Texas at Austin

Date submitted: 07 Dec 2012 Electronic form version 1.4