Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

The infrared complex magneto-optical conductivity tensor in $\mathbf{Ca}_x\mathbf{Sr}_{1-x}\mathbf{RuO}_3$ films M.-H. KIM, G. ACBAS, C.T. ELLIS, M.-H. YANG, J. CERNE, Physics Dept., Univ. at Buffalo, SUNY, Buffalo, NY, P. KHALIFAH, Chemistry Dept., Univ. at Stony Brook, SUNY, Stony Brook, NY, I. OHKUBO, Applied Chemistry Dept., Univ. of Tokyo, Tokyo, Japan, H. CHRISTEN, D. MANDRUS, Oak Ridge Natl. Lab., Materials Science and Tech. Division, Oak Ridge, TN, Z. FANG, Inst. of Physics, Chinese Acad. Sci., Beijing, China — We explore the complex longitudinal (σ_{xx}) and Hall (σ_{xy}) conductivities, as well as the complex Hall angle (θ_H) in a series of $Ca_xSr_{1-x}RuO_3$ films by measuring the infrared (E = 115 - 1400 meV) magnetization-induced complex Faraday and Kerr angles in the 10 - 300 K temperature (T) range. The Hall sign reversal with T at 117 meV is observed up to 20% Ca composition. It is similar to the sign reversal in the dc $\theta_H(T)$. The sign reversal T decreases with increasing Ca composition. The infrared $\sigma_{xy}(E)$ and $\theta_H(E)$ show strong E dependence at low energies. As Ca composition increases, the magnitude of the $\mathrm{Re}(\theta_\mathrm{H}(\mathrm{E}))$ dip decreases while the energy and width of the $\mathrm{Im}(\theta_\mathrm{H}(\mathrm{E}))$ dip increases. We analyze the results in terms of intrinsic and extrinsic anomalous Hall effect models. This work was supported by the Research Corp. Cottrell Scholar Award (UB), NSF-CAREER-DMR0449899 (UB), and an instrumentation award from the CAS (UB). Oak Ridge Natl. Lab is managed by UT-Battelle, LLC for the U.S. DOE (contract DE-ACO5-00OR22725).

M.-H. Kim
Physics Dept., Univ. at Buffalo, SUNY, Buffalo, NY

Date submitted: 03 Dec 2009 Electronic form version 1.4