Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Temperature-dependent time-domain THz spectroscopic study of spinel $NiCo_2O_4$ thin films PUNAM SILWAL, TIANQI SHAN, DAEHO KIM, DIYAR TALBAYEV, Tulane University — The unique combination of electrical conductivity, infrared transparency, electro catalytic activity, and ferrimagnetic order makes the spinel $NiCo_2O_4$ an attractive material for various technological applications. Our previous study showed that high quality epitaxial spinel $NiCo_2O_4$ films on $MgAl_2O_4$ (001) substrate exhibit metallic behavior accompanied by ferrimagnetic order. The electrical properties of these films can be tuned from metallic to insulating by changing the growth temperature. The comprehensive understanding of the microscopic details of carrier transport in these films requires the study of frequency-dependent optical properties. Terahertz time-domain spectroscopy (THz TDS) can determine the frequency dependent complex dielectric constant, refractive index, and optical conductivity. We used THz TDS to measure the optical properties of $NiCo_2O_4$ in the 0.2 – 2.7 THz spectral region. The complex conductivities display a Drude-type frequency response. The extrapolated DC conductivity is consistent with our previous work. The temperature- and growth-condition dependent Drude parameters provide further insight in the metal-insulator transition in these materials.

Punam Silwal
Tulane University

Date submitted: 12 Nov 2012 Electronic form version 1.4