Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magnetically Tunable Polymer Nanocomposites for RF and Microwave Device Applications K. STOJAK, S. PAL, H. SRIKANTH, University of South Florida-Physics, C. MORALES, J. DEWDNEY, J. WANG, T. WELLER, University of South Florida-Electrical Engineering — There has been much interest in polymer nanocomposites (PNC) recently due to potential applications for EMI shielding, tunable electromagnetic devices and flexible electronics. We report synthesis, structural, magnetic and RF characterization on PNCs ranging from 20-80 wt-% loadings of Fe_3O_4 and $CoFe_2O_4$ nanoparticles ($\sim$8nm) in a thermosetting resin from the Rogers Corporation. Nanoparticles were synthesized by thermal decomposition and characterized by XRD and TEM. Magnetic properties were studied using a Quantum Design PPMS. PNCs displayed characteristic features of superparamagnetism at room temperature and blocking at low temperature. Microwave transmission/reflection studies were done using a microstrip resonator. Strong tunability in the microwave absorption was observed. We extend our study to include nanoparticle-filled multi-walled carbon nanotubes synthesized by CVD. These high-aspect ratio magnetic nanostructures, with tunable anisotropy, are of particular interest in enhancing magnetic and microwave responses in existing PNCs.

Kristen Stojak
University of South Florida-Physics

Date submitted: 10 Dec 2010 Electronic form version 1.4