Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Magnetic Properties of Ni Nanoparticles Dispersed in Polystyrene-Isoprene-Polystyrene Triblockcopolymers
MIRCEA CHIPARA, Indiana University, YOU QIANG, University of Idaho, LINFENG GUO, Indiana University, AMINIAN HOSSEIN, Umicore, JEFFREY M. ZALESKI, Indiana University, SY-HWANG LIOU, University of Nebraska — Polymer based magnetic nanocomposites were obtained by dispersing Ni nanoparticles within polystyrene-isoprene-polystyrene block copolymers. High power sonication (500 W) was used to obtain an uniform dispersion of magnetic nanoparticles. The dependence of the magnetic properties of these nancomposite materials as a function of Ni concentration (from 0 % Ni to about 25 % Ni) and temperature (in the range 100 K to 500 K) was analyzed. The agglomeration of Ni nanoparticles above the glass transition of the hard phase was observed. The process is irreversible. The agglomeration of nanoparticles is triggered by the fast decrease of diffusion coefficients above the glass transition temperature of the hard phase. Such large changes of magnetic properties triggered by the elastic properties of the matrix were not yet been reported. Ferromagnetic resonance data on Ni based composites in the temperature range 100 to 500 K confirmed the agglomeration of Ni nanoparticles and supported the irreversible character of this modification. Additional magnetic data were obtained by SQUID, VSM, and AFM (with magnetic tips).

Mircea Chipara
Indiana University

Date submitted: 03 Dec 2005 Electronic form version 1.4