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Synthesis of Magnetic Nanoparticles for Biosensing Studies Using Magneto-Impedance Technology[1] ROSEMARY SHELDEN, Covenant College, RAMON RUIZ, KRISTEN STOJAK, NICHOLAS LAURITA, ANURAG CHATURVEDI, University of South Florida, PHILLIP BROUSSARD, Covenant College, MANH-HUONG PHAN, HARIHARAN SRIKANTH, University of South Florida — Polymer nanocomposites (PNCs) have been shown to be a compact and durable solution for applications such as electromagnetic interference shielding and magnetically tunable microwave devices. We report studies aimed at exploring applications of PNCs to aid in bio-sensing, using the Giant Magneto-Impedance (GMI) effect. GMI is a change in the ac impedance of a ferromagnetic conductor in a varying dc magnetic field, and has been shown to be about 500 times more sensitive than its counterpart, Giant Magneto-Resistance (GMR). In our study, magnetite (Fe_3O_4) nanoparticles (mean size, 6±2 nm) were synthesized by thermal decomposition and dispersed in a polymer provided by the Rogers Corporation to create PNCs with 20, 50, and 80 wt% compositions. The GMI of an amorphous magnetic ribbon was measured with and without the PNCs layered on the ribbon. The effects of nanoparticle concentration on the GMI sensitivity were studied, with a view toward applications in highly sensitive bio-molecular detection.

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Rosemary Shelden
Covenant College

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