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Dispersion of magnetic nanoparticles in polymer films J. GASS, J. ALMAND, P. PODDAR, H. SRIKANTH, Department of Physics, University of South Florida, Tampa, FL — Magnetic nanoparticles embedded in polymer matrices have excellent potential for EMI shielding and biomedical applications. However, uniform dispersion of particles in polymers without agglomeration is quite challenging. We have fabricated PMMA/polypyrrole bilayer structures embedded with Fe_3O_4 magnetic nanoparticles (mean size $\sim$ 12 nm) synthesized using wet chemical methods. The magnetic polymer nanocomposites were spin-coated on various substrates. Agglomeration-free dispersion of nanoparticles was achieved by coating the particles with surfactants and by dissolving both the particles and PMMA in cholorobenzene. Structural characterization was done using XRD and TEM. Magnetic properties of the bilayer structures indicated that the superparamagnetic and ferromagnetic response of the polymer nanocomposites including parameters such as the coercivity, remanence and saturation magnetization could be systematically varied with controlled amounts of nanoparticle dispersions in the polymer media. The RF impedance up to frequencies of 3 GHz measured using a vector network analyzer will also be presented. Overall, we demonstrate that magnetic polymer nanocomposite films are excellent candidates for EMI suppression applications. Work supported by NSF through Grant No. ECS 0140047

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