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Synthesis and Frequency Dependent Properties of Ferromagnetic Nanoparticles/Polyurethane Nanocomposites CHRISTY VESTAL, UTC, MAX ALEXANDER, AFRL/MLBP — The development of materials with high permeability, high permittivity and with low loss is of interest due to their application in microelectronics and microwave communication systems. Although ferromagnetic materials display high permeabilities, they have limited applications in microwave applications due to their large conductivities that limit the ability of microwaves to penetrate into bulk materials. One approach commonly taken to overcome the limitations of bulk ferromagnetic materials is to disperse ferromagnetic inclusions in an insulating matrix (i.e. a dielectric material). Although polymeric nanocomposites with magnetic inclusions of different dimensionality and chemistry are possible, efforts to understand and evaluate the effects of nano-sized inclusions have been limited and a general understanding is necessary to establish structureproperty relationships of these materials. Here we report the frequency dependent properties of ferromagnetic nanoparticle/polyurethane nanocomposites as a function of nanoinlcusoin loading and nanoparticle size. Novel magnetic core/shell nanoparticles will also be synthesized and evaluated.

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