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Magnetic Hyperthermia in ferrofluid-gel composites[1] HUMESHKAR NEMALA, ANSHU WADEHRA, Wayne State University, MI, AMBESH DIXIT, IIT Rajasthan, India, RAJESH REGMI, Sloan-Kettering Cancer Center, NY, PREM VAISHNAVA, Kettering University, MI, GAVIN LAWES, RATNA NAIK, Wayne State University, MI
— Magnetic hyperthermia is the generation of heat by an external magnetic field using superparamagnetic nanoparticles. However, there are still questions concerning magnetic hyperthermia in tissue; in particular the confinement of the nanoparticles at mesoscopic scales. We used Agarose and Alginate gels as models for human tissue and embedded magnetic nanoparticles in them. We report the synthesis and characterization of dextran coated iron oxide (Fe_3O_4) nanoparticles. Characterization of these nanoparticles was done using X-ray diffraction, transmission electron microscopy, magnetometry, and hyperthermia measurements. Temperature dependent susceptibility measurements reveal a sharp anomaly in the ferrofluid sample at the freezing temperature. This is conspicuously absent in the ferrofluid-gel composites. Heat generation studies on these superparamagnetic gel-composites revealed a larger heat production in the ferrofluids($\sim$4W/g) as compared to the gels($\sim$1W/g), which we attribute to a reduction in Brownian relaxation for the nanoparticles embedded in Agarose and Alginate.

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