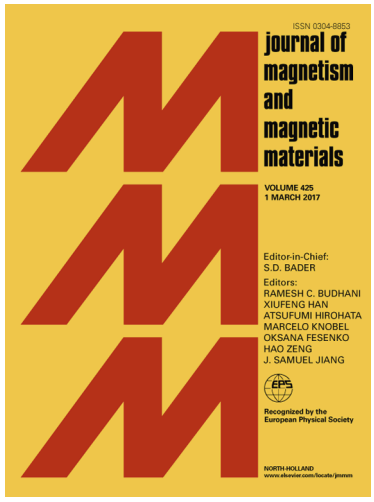

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Dextran coated magnetite high susceptibility nanoparticles for hyperthermia applications

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Abstract

In this study, the magnetic fluid with various concentrations of well-dispersed dextran coated Fe_3O_4 nanoparticles were synthesized for hyperthermia application. The dextran-coated colloidal suspension, in the form of clusters of several Fe_3O_4 nanoparticles, maintains superparamagnetic behavior of Fe_3O_4 with the saturation magnetization of 59 emu/g at room temperature. The coated nanoparticles dispersed in aqueous medium agglomerate to form a monodisperse system and its average polydispersity index is 0.096. The inter-particle interaction caused the large susceptibility (1239 emu/gT) in dextran coated Fe_3O_4 nanoparticles. Effect of magnetic dipole interaction between the clusters on magnetic properties and heat capacity was examined by comparing specific loss power (SLP) of magnetic fluids at different Fe_3O_4 concentration. The intrinsic loss power (ILP) parameter increases with decreasing concentration of the dextran coated Fe_3O_4 and reaches the value of **15.6 nHm^2/kg**, which is **35%** better than the best commercial equivalents. This result clearly shows that magnetic interaction between coated particles strongly influences induction heating efficiency of magnetic fluid. The in-vitro toxicity experiments of magnetic fluids with Madin Darby Canine Kidney cells prove that our obtained magnetic fluids are promising for the hyperthermia cancer treatment application.