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Magnetic properties of Fe_3O_4 and $CoFe_2O_4$ ferrofluids M.B. MORALES, J. GASS, S.L. MORROW, H. SRIKANTH, Department of Physics, University of South Florida — We study in detail the magnetic properties of ferrofluids consisting of $\sim$0.02 g/cm^3 volume concentration of surfacted Fe_3O_4 and $CoFe_2O_4$ nanoparticles suspended in two solvents, hexane and dodecane, with different room temperature viscosities. DC and AC magnetization measurements were done using a Physical Properties Measurement System (PPMS). Hysteresis loops of Fe_3O_4 in both liquids at different temperatures show that the particles are superparamagnetic having low coercivities even at low temperature. $CoFe_2O_4$-based ferrofluids, on the other hand, have a wide range of grain sizes and show high coercivity of 10 kOe at low temperature. From the ZFC-FC curves, the blocking temperature was determined to be 76 K and 223 K for Fe_3O_4 and $CoFe_2O_4$ in dodecane, respectively. To probe the dynamic relaxation effects, temperature-dependent complex AC susceptibility of all the ferrofluids were measured at frequencies of 100 Hz and 10 kHz. From these data sets, the relaxation contributions due to Neel and Brownian mechanisms were identified. We will also report on systematic magnetic measurements and analysis of ferrofluids with different nanoparticle concentrations.

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