Simulation of the Magnetic Properties of Close Packed Arrays of Maghemite Nanospheres

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ABSTRACT: Experiments on dilute monodispersed iron oxide (maghemite) nanospheres (D ~ 6 nm - 12 nm) indicate a complex internal magnetic structure in which the surface spins form a glass like state that gives rise to a blocking transition at low temperature [1]. In more recent studies on self assembled fcc arrays of magnetic nanopsheres the blocking transition appears to be suppressed [2]. This may be attributed to the ferromagnetic ordering of the nanospheres due to the dipolar interaction between them [2,3]. Modelling these systems is complicated by the complex interplay between the internal magnetic structure of the nanospheres and the dipole fields induced by the closed packed structure of the nanosphere array. We present simulation results on FCC arrays of maghemite nanospheres that combines a self consistent treatment of both the internal degrees of freedom of the nanospheres and the dipolar interactions between them.

[1] Shendruk, T.N., et al. Nanotechnology, **18**, 455704 (2007)
[2] Kasyutich, O., et al . Physical Review Letters, **104**, 127205 (2010)
[3] Plumer M. L. , et al. , J. Phys.: Condens. Matter, **22**, 29600 (2010)

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