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**Magnetic resonance study of nanoparticles systems** NATALIA NOGINOVA, FENG CHEN, TRACEE HARRIS, NSU, EMMANUEL GIANNELIS, ATHANASIOS BOURLINOS, Cornell University, VADIM ATSARKIN, IRE, Moscow — Magnetic nanoparticles of gamma-$Fe_2O_3$ coated by organic molecules and suspended in liquid and solid matrices, as well as non-diluted magnetic fluid have been studied by ESR in the dependence on temperature and relative concentration. The ESR spectrum demonstrates an interesting double feature shape, with narrow peak at g=2 growing in intensity with increase in temperature. Angular dependence of the ESR signal in field cooled samples unambigously points to the dominating uniaxial magnetic anisotropy of the nanoparticles, suggesting a strong surface effect. The interpretation based on the FMR equations with account made for thermal fluctuations of the magnetic moment is compared with "paramagnetic" model suggesting a discrete energy spectrum of the lowest high-spin multiplet. Consideration of the superparamagnetic nanoparticles as intermediate between paramagnetic and ferromagnetic entities allows us to explain most of the obtained experimental results and estimate parameters of the magnetization, particle interactions and magnetization dynamics.

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