

Investigation of negative remanence in a randomly distributed cobalt nanoparticle system

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We observed abnormal magnetic behaviors (so-called negative remanence or inverted hysteresis loops) in a randomly distributed Co nanoparticle (NP) system, where the Co NPs are prepared using laser irradiation. The inverted hysteresis loops are observed when ferromagnetic and superparamagnetic phases coexist within the NP system. Normal hysteresis loops appear in samples having only one phase, either ferromagnetic or superparamagnetic. The ferromagnetic and superparamagnetic Co NPs, with an average diameter of 25 nm and 4 nm, respectively, showed negative remanence over a temperature range of 92-300 K. We have proposed that these abnormal features are directly related to the dipolar interaction between the superparamagnetic Co NPs and a ferromagnetic Co NP.