

Abstract Submitted
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A comparison of methods for the determination of the magnetocrystalline anisotropy constant in Fe_3O_4 nanoparticles RONALD TACKETT, Department of Physics, Kettering University, MEGAN ALLYN, Department of Chemistry and Biochemistry, Kettering University, GILLIAN RYAN, RONALD KUMON, CORNEL RABLAU, Department of Physics, Kettering University, VIJAYENDRA GARG, ADERBAL DE OLIVEIRA, Institute of Physics, University of Brasilia, Brazil, PREV VAISHNAVA, Department of Physics, Kettering University — The dynamics of the relaxation behavior of superparamagnetic nanoparticles is governed by many factors such as the anisotropy constant, composition, size and nature of coating of the nanoparticles particles. We report values of the anisotropy constant (K) for magnetite nanoparticle (size ~ 12 nm) coated with dextran and suspended in water by dc and ac magnetization measurements, Mossbauer spectroscopy and the temperature dependent specific absorption rate (SAR) measurement. The magnetite nanoparticles were synthesized by co-precipitation and characterized by x-ray diffraction (XRD) and Transmission electron microscopy (TEM). The K values from dc magnetic susceptibility, Mössbauer spectroscopy, ac magnetic susceptibility, and that obtained by temperature dependent SAR measurements are all within the range of the accepted values in the literature. Merits and demerits of the four methods of determining K values will be discussed. We will also report on the temperature dependence of the anisotropy constant and the Néel relaxation constant.

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