Abstract Submitted
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Effects of Particle Size on the Magnetic Properties of Maghemite Nanoparticles[1] KELLY L. PISANE, MOHINDAR S. SEEHRA, Department of Physics and Astronomy, West Virginia University — The effects of particle size on the magnetic properties of oleic-acid-coated maghemite (γ-Fe_2O_3) nanoparticles (NPs) with average diameters of 3.2 nm and 7.0 nm are reported. These samples were prepared by identical procedures and characterized by x-ray diffraction, transmission electron microscopy, FTIR spectroscopy and temperature-dependent ac and dc magnetometry. The zero field-cooled and field-cooled magnetization M vs. T data under H = 100 Oe yield the blocking temperature $T_B \approx 21$ K (35 K) for the 3.2 nm (7.0 nm) NPs. Changes in T_B with changes in the measuring frequency f_m (10 Hz to 10 kHz) are used to determine the Neel-Brown relaxation time and the strength of inter-particle interaction. Above T_B, the data of M vs. H up to H =90 kOe are used to determine magnetic moment per particle and to understand the effects of size distribution on the measured properties. Below T_B, the plots of M vs. H show surprisingly negligible hysteresis with coercivity $H_C \approx 20$ Oe for both NPs. Interpretation of these results will be presented along with comparison with results obtained from bulk maghemite.

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