Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Probing the effect of interparticle interactions in ferrite nanoparticles using the reversible transverse susceptibility method M.B. MORALES, P. PODDAR, N.A. FREY, H. SRIKANTH, Dept. of Physics, Univ. of South Florida, Tampa, FL, S.A. MORRISON, E.E. CARPENTER, Dept. of Chemistry, Virginia Commonwealth Univ., Richmond, VA — Spin dynamics in magnetic nanoparticles is an issue of current interest. It is important to understand how interparticle interactions in a 3-dimensional arrangement of nanoparticles as well as their surface functionalization would affect the global magnetic response, in particular, the magnetic anisotropy. We report the influence of surface functionalization and systematic dipolar interactions strength variation on the magnetic properties of surfactant-coated monodispersed manganese zinc ferrite ($Mn_{0.68}Zn_{0.25}Fe_{2.07}O_3$) nanoparticles of 15 nm mean particle size using temperature and field-dependent reversible transverse susceptibility measurements at a 12 MHz resonant frequency. Our experiments reveal that the characteristic features in the transverse susceptibility –viz. the position, height and symmetry of the peaks at anisotropy fields -are extremely sensitive to interparticle interactions and surface chemistry of the nanoparticles. In contrast to earlier theoretical suggestions, our experimental results suggest that the transverse susceptibility technique can be used effectively even for strongly interacting magnetic nanoparticle systems. Work at USF supported by NSF through a GOALI grant from DMII.

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Date submitted: 30 Nov 2007 Electronic form version 1.4