Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Effect of surface structure on the dynamic magnetic response in Ni-Zn ferrite nanoparticles P. PODDAR, H. SRIKANTH, Physics Department, University of South Florida, R. SWAMINATHAN, M. E. MCHENRY, MS&E Department, Carnegie Mellon University — Surface magnetic spin structure plays a dominant role in determining the effective anisotropy in magnetic nanostructures. To probe the anisotropy in nanoparticle systems, we have developed an RF transverse susceptibility technique based on a resonant tunnel-diode oscillator (TDO). Transverse susceptibility measurements were performed on NiZn ferrite nanoparticles (synthesized using a RF induction plasma torch) over a wide temperature range (10K to 300K) and magnetic fields (-10kOe to 10kOe). As-synthesized polydisperse nanoparticles showed broad peaks at the characteristic anisotropy fields that are attributed to the presence of both the (100) and (111) surfaces and their respective surface anisotropy contributions. The peak positions and heights were found to be sensitive to the particle size dispersion and surface magnetic spin structure. The polydisperse particles were coated with oleic acid and size-selected using ultra-centrifugation. The anisotropy peaks are conspicuously absent in the size-selected smaller nanoparticles. This is understood within the framework of a surface structure model based on isotropic canted triangular spin structures on the dominant (111) surfaces in the smallest nanoparticles. Work at USF supported by NSF through Grant No. CTS-0408933. RS and MEM thank the Institute of Complex Engineering Systems (ICES), CMU for support.

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Date submitted: 27 Mar 2013 Electronic form version 1.4