Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Probing magnetic anisotropy and exchange bias in coupled Au-Fe_3O_4 nanoclusters S. CHANDRA, N.A. FREY, M.H. PHAN, H. SRIKANTH, University of South Florida, C. WANG, S. SUN, Brown University — The study of magnetic anisotropy and exchange bias in coupled nanoparticle systems is of topical interest. We have demonstrated radio frequency (RF) transverse susceptibility (TS) using a sensitive, self-resonant tunnel-diode oscillator (TDO) technique developed by us to be excellent for probing magnetic anisotropy and exchange bias (EB) in Fe_3O_4 particles grown epitaxially on one or multiple facets of polyhedral Au seed particles forming dumbbell- or flower-shaped Au-Fe_3O_4 nanoclusters. TS experiments reveal a strong increase in magnetic anisotropy in coupled Au-Fe_3O_4 nanoclusters compared to pure Fe_3O_4 nanoparticles. TS experiments also probe a surface spin glass transition (T_F), a sharp increase in surface anisotropy at T_F, and a strong increase in EB with temperature below T_F in the flower-shaped nanoclusters. Our RF susceptibility measurements are in good agreement with conventional AC and DC magnetometry. The influence of the Au interface(s) on the surface spin configuration of Fe_3O_4 nanoparticles will be discussed.

Sayan Chandra
University of South Florida

Date submitted: 17 Nov 2009 Electronic form version 1.4