Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magnetic Characterization of Ferrite Nanoparticles MATTHEW BRYAN, PAUL SOKOL, Department of Physics, indiana University, GREG GUMINA, LYUDMILA BRONSTEIN, BOGDAN DRAGNEA, Department of Chemistry, Indiana University — Magnetic nanoparticles (NPs) of different compositions (FeO/Fe_3O_4, g-Fe_2O_3, FePt, and $CoFe_2O_4$) have been synthesized using high temperature organometallic routes described elsewhere. NPs (16.6 nm in diameter) of a mixed FeO/Fe_3O_4 (wuestite/magnetite) composition were prepared by thermal decomposition or iron oleate in the presence of oleic acid as a surfactant in dodocane at 370C in argon atmosphere. After the thermal treatment of the reaction solution at 200 C under air for 2 hours these NPs are transformed into maghemite (g-Fe_2O_3), the magnetization of which is significantly enhanced. NPs of $CoFe_2O_4$ (8 nm) have been prepared by simultaneous decomposition of Co(II) and Fe(III) acetylacetonates in the presence of oleic acid and oleylamine. The X-ray diffraction profile of these NPs is characteristic of cobalt ferrite. Alternatively, alloyed 1.8 nm FePt NPs prepared by simultaneous decomposition of Fe and Pt acetylacetonates in the reductive environment demonstrate a completely disordered structure, which is reflected in their magnetic properties. SQUID magnetometry was used to measure the magnetization of NPs at high and low temperatures. Zero-field cooling and field-cooling measurements were taken to demonstrate superparamagnetic behavior and an associated blocking temperature.

Paul Sokol
Indiana University

Date submitted: 19 Nov 2010 Electronic form version 1.4