

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**The anomalous exchange bias effect in core-shell Co/CoO nanoparticles** MIKHAIL FEYGENSON, YIU YUEN, KISUB KIM, MEIGAN ARONSON, Brookhaven National Laboratory, Upton NY 11973 — We study the anomalous exchange bias effect in Co/CoO nanoparticles by means of neutron and x-ray scattering and magnetic experiments. The Co nanoparticles were prepared in oleic acid by thermal decomposition of  $\text{Co}_2(\text{CO})_8$  and were subsequently oxidized. Co core- CoO shell nanoparticles with differing core and shell dimensions were obtained. The magnetic measurements indicated that there is an optimal ratio of the core and shell dimensions which maximizes the exchange bias field. Anomalous small angle x-ray scattering experiments using core-shell contrast and energy analysis provide high accuracy measurements of the core and shell, and their respective size distributions. Neutron diffraction measurements find that oxidation introduces a new modulation wave vector for the magnetization, leading to the increasing magnetic decompensation of the core-shell interface. It is our proposal that this interface moment enhances the exchange coupling of the core and shell, and leads to the extraordinarily large exchange bias effect.

Mikhail Feygenson  
Brookhaven National Laboratory, Upton NY 11973

Date submitted: 21 Nov 2007

Electronic form version 1.4