## Abstract Submitted for the MAR13 Meeting of The American Physical Society

Magnetic Re-

versal of Onion-Like  $Fe_3O_4|MnO|\gamma-Mn_2O_3$  Core|Shell|Shell Nanoparticles KATHRYN KRYCKA, JULIE BORCHERS, NIST Center for Neutron Research, MARK LAVER, Paul Scherrer Institute, GERMAN SALAZAR-ALVEREZ, Stockholm University, ALBERTO LOPEZ-ORTEGA, CIN2(ICN-CSIC) and Universitat Autonoma de Barcelona, MARTA ESTRADER, Stockholm University, SANTIAGO SURINACH, MARIA BARO, Universitat Autonoma de Barcelona, JORDI SORT, Universitat Autonoma de Barcelona and ICREA, JOSEP NOGUES, CIN2(ICN-CSIC) and Universitat Autonoma de Barcelona and ICREA, FM—AFM—FM NANOPARTICLES COLLABORATION — Magnetic nanoparticles offer potential for biomedical and data storage applications, especially with exchange bias to overcome the superparamagnetic limit. Here we study the role of an antiferromagnetic layer sandwiched between a soft ferrimagnetic core and hard ferrimagnetic shell. The nanoparticles studied consist of 3 nm (diameter) Fe<sub>3</sub>O<sub>4</sub> |50-60 nm thick MnO shell [5 nm thick  $\gamma$ -Mn<sub>2</sub>O<sub>3</sub> shell [1]. Small-angle neutron scattering (SANS) probes both structural and magnetic morphology. SANS reveals that during reversal from 5 T to -5 T at 5 K, there is an increase in spins oriented perpendicular to the applied field. As the temperature is increased to 150 K (above the 123 K Néel temperature of MnO) evidence of an enhanced magnetism from within the MnO shell is observed. Finally, the scattering pattern shifts (indicating a change in the relative magnetism as a function of radius) between 5 K and 50 K.

[1] A. López-Ortega *et al.*, Nanoscale 4, 5138 (2012); Salazar-Alvarez *et al.*, J. Am. Chem. Soc., 133, 16738 (2011)

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Date submitted: 17 Nov 2012 Electronic form version 1.4