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Neutron diffraction studies of exchange-biased Co/CoO core-shell nanoparticles SUE INDERHEES, GLENN STRYCKER, MEIGAN ARONSON, University of Michigan, YIMING QIU, JULIE BORCHERS, NIST, YADONG YIN, Lawrence Berkeley National Lab — We present neutron diffraction data on exchange-biased Co/CoO core-shell nanoparticles. Surfactant-coated Co particles were prepared by thermal decomposition of $Co_2(CO)_8$, then oxidized to form core/shell particles with a poly-crytalline CoO shell. Magnetization data display strong exchange bias below the 200K blocking temperature (T_B), well below the Neel temperature of bulk CoO (293 K). Neutron diffraction data show a broad peak at the (½ ½ ½) antiferromagnetic CoO ordering wave vector. The anti-ferromagnetic order parameter is constant below T_B, and decreases with increasing temperature above T_B. These results demonstrate that the diminished T_B in small core/shell particles is not due to a reduction of T_N of the antiferromagnetic shell.

Sue Inderhees
University of Michigan

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