Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Shape Anisotropy and Magnetization Modulation in Hexagonal Cobalt Nanowires ZUWEI LIU, PAICHUN CHANG, CHIA CHI CHANG, GERD BERGMANN, JIA G. LU, University of Southern California — Ferromagnetic Co nanowires with diameter around 90 nm are synthesized via low voltage electrodeposition method. High resolution transmission electron microscopy and x-ray diffraction results show that the nanowires are uniform in size, and consist predominantly *hcp* structure with the magnetocrystalline easy axis (*c*-axis) perpendicular to the wire axis. SQUID measurement illustrates the dominance of shape anisotropy, manifested by the weak temperature dependence of the enhanced coercive field along the nanowire axis. The magnetic domain structures of individual, segmented or multiple nanowires are studied via magnetic force microscopy. It shows a strong dipole at the two ends of the nanowire, together with a spatial magnetization modulation along the nanowire with a period around 700 nm. Based on theoretical modeling, such intrinsic modulation originates from the competition between the magnetocrystalline polarization along the easy axis and the shape anisotropy along the nanowire axis.

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Date submitted: 28 Nov 2007 Electronic form version 1.4