Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Annealing effects of chemically synthesized FePt nanocrystal films CHANGBAE HYUN, CASEY ISRAEL, ALEX DE LOZANNE, Department of Physics, University of Texas at Austin, DOH C. LEE, BRIAN A. KORGEL, Department of Chemical Engineering, University of Texas at Austin — Chemically synthesized FePt nanocrystals can exhibit room temperature ferromagnetism after being annealed at temperatures above ∼500°C[1]. The thermal annealing changes the crystal structure from face-centered cubic to the hard magnetic face-centered tetragonal phase. In thick nanocrystal films, the coercivity can be quite large, however, the coercivity of thin films has been found to decrease significantly with decreasing thickness, even losing the room temperature ferromagnetism in some cases[2]. In order to help determine how the microscopic magnetic structure in these thin films evolves with film thickness, we studied using magnetic force microscopy (MFM), under external applied fields, films consisting of 4 to 15 nanocrystal monolayers. We cast smooth films of 4 nm diameter FePt nanocrystals and annealed them at temperatures ranging from 400 to 650°C, acquiring MFM images as a function of annealing temperature. Thin FePt films showed lower coercivity than thick films. To help interpret the MFM images, complementary magnetic and structural data was obtained using SQUID magnetometry, x-ray diffraction, and transmission electron microscopy (TEM). [1] S. Sun et al., Science 287, 1989 (2000). [2] G. A. Held et al., Journal of Applied Physics 95, 1481 (2004)

Changbae Hyun
Department of Physics, University of Texas at Austin

Date submitted: 01 Dec 2004 Electronic form version 1.4