Abstract Submitted
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Confinement Effect on the Phase Transformation of FePt from A1 to L1[1] ANDREW GALLAGHER, LEVENT COLAK, OZAN AKDOGAN, GEORGE HADJIPANAYIS, Department of Physics and Astronomy, University of DE, Newark, DE, 19711, USA — The major challenge for the application of chemically synthesized FePt nanoparticles (NPs) in magnetic storage media is the sintering problem encountered during the required high temperature annealing to obtain the high anisotropy $L1_0$ phase. In this work, we have used two methods to avoid sintering: coating the NPs with a protective layer of silica (SiO_2) and using porous aluminum oxide (Al_2O_3) as a template to hold the NPs. The NPs were synthesized via the synthesis method of Sun *et al.*[1] The NPs were added to the Al_2O_3 by in-situ suctioning of the reaction solution into the porous Al_2O_3 template. Monodispersed FePt NPs with a size of 5.8 and 15 nm were coated with SiO_2 shells using a water-in-oil microemulsion method. High room temperature coercivities were only obtained after annealing the samples at 900 $^\circ$C for long times (24-48 h) under forming gas flow as compared to the usual 600-700 $^\circ$C. Values of 4.7 and 7.8 kOe were observed in SiO_2 and Al_2O_3 samples, respectively after annealing for 24 h at 900 $^\circ$C. This behavior suggests that the restricted geometry of the samples suppresses the phase transformation drastically.

[1] S. Sun, C. B. Murray, D. Weller, L. Folks, A. Moser *Science* **2000**, 287, 1989.

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