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Variability in the extent of ordering for individual FePt $L1_0$ nanoparticles RUMYANA V. PETROVA, BO YAO, VU LAM, K.R. COFFEY, University of Central Florida, Orlando, FL 32815 USA, R.R. VANFLEET, Brigham Young University, Provo, Utah 84602, USA — $L1_0$ordered phase FePt nanoparticles are of interest as high-density magnetic recording media due to the large uniaxial magnetocrystalline anisotropy,K_u observed in bulk and thin film samples. Similarly high Ku values have not yet been achieved for small (<10nm) FePt nanoparticles. Mixtures of ordered and disordered nanoparticles are often observed and have been attributed to nucleation barriers for the ordering transformation in individual small nanoparticles. For FePt, K_u is known to depend strongly on the extent of long-range chemical order. In this work we report on the variability of the extent of order amongst ordered $L1_0$ FePt particles. Well-isolated, small FePt nanoparticles were prepared from discontinuous FePt films, using ultra high vacuum dc magnetron sputtering. A Tecnai F30 analytical transmission electron microscope was used to characterize the FePt nanoparticles. Convergent beam electron diffraction patterns from individual nanoparticles were compared to multislice simulations to determine the extent of order of single nanoparticles.

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