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Size Effect on Chemical Ordering in Face-Centered Tetragonal FePt Nanoparticles[1] DAREN LI, NARAYAN POUDYAL, VIKAS NANDWANA, J.PING LIU, Department of Physics, University of Texas - Arlington — Monodisperse face-centered tetragonal (fct) FePt nanoparticles with high magnetocrystalline anisotropy have been obtained by means of the salt-matrix annealing technique. The as-synthesized face-centred cubic (fcc) FePt nanoparticles of different sizes were mixed with NaCl powder particles and the mixture was annealed at temperatures up to 750 ^{o}C for several hours. X-ray diffraction (XRD) and transmission electronic microscopy (TEM) analyses showed that the annealed particles transfered to the fct structure without sintering and agglomeration. Magnetization measurements gave the coercivity of the nanoparticles increasing with the particle size. Extended annealing does not change the size dependence of the coercivity. Further XRD analysis revealed that the size dependence of the coercivity is related to the particle size dependance of long-range chemical ordering degree. The long-range order parameter S is 0.78, 0.92, 0.98 and 0.94 for the 4 nm, 6 nm, 8 nm and 15 nm particles, respetively. This trend is consistent with that of the coercivity measured from the nanoparticles. The relatively low ordering parameter of the 15 nm particles may be related to the polycrystalline morphology as shown by the high resolution TEM.

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