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Anisotropy, coercivity and thermal activation in $L1_0$-FePt Nanoparticles. CHUANBING RONG, NARAYAN POUDYAL, J. PING LIU, Department of Physics, University of Texas at Arlington, Arlington, TX 76019 — $L1_0$ FePt materials have attracted tremendous attention for their potential applications due to their high anisotropy and excellent mechanical properties. It is well known that the magnetization behavior of small particles is strongly affected by thermal fluctuation especially when the particle size is close to the critical size of superparamagnetic. In this work, the size effect on anisotropy constant K_u, magnetic viscosity parameter S, activation volume V_{ac} and coercivity H_c of the $L1_0$ FePt nanoparticles obtained by the salt-matrix annealing have been studied systematically. It was found that K_u increases with increasing particles size. The maximum field-dependent viscosity parameter S_{max} increases monotonously with temperature for the particles with size of 3 nm to 8 nm. Moreover, S_{max} of small particles is more sensitive to temperature than that of large particles. However, the temperature dependence of both S_{max} and V_{ac} of the 15 nm particles are different from those for 3-8 nm particles. Further analysis of relation between H_c and V_{ac} suggested that the 3-8 nm particles are ideal single-domain particles, while the 15 nm particles can not be well described as single-domain particles even the particle size is much smaller than the single-domain size.

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