Magnetocrystalline properties of Iron-Platinum (L10-FePt) nanoparticles through phase transition

M Farahmandjou
Department of Physics, Islamic Azad University, Varamin Branch, Varamin, Iran
Email: farahmandjou@iauvaramin.ac.ir

(Received 19 April 2013 ; in final form 3 January 2016)

Abstract
High magneto-crystalline anisotropy \( k_u = 7 \times 10^6 \) \( \text{j/m}^3 \) of L10-FePt nanoparticles are an excellent candidate for ultra high-density magnetic recording. The 4 nm FePt nanocrystals were prepared by superhydride reduction of \( \text{FeCl}_2 \cdot 4\text{H}_2\text{O} \) and \( \text{Pt(acac)}_2 \) precursors in the phenyl ether by reduction of the 1, 2-hexadecanediol and LiBEt\(_3\)H superhydride. The crystal and magnetic structures were studied by XRD and VSM analysis. By TEM and EDS analyses the size distribution and molar concentration of Fe/Pt of the nanoparticles were determined. The results showed that the particles are first superparamagnetic before heat treatment and then a phase transition accrue from disorder fcc to order fct structure after annealing. Finally, the phase transition leads the magnetic anisotropy of hard FePt nanoparticles to increase to 7 kOe.

Keywords: anisotropy, L10-FePt, magneto-crystalline, nanocrystals, phase transition, superparamagnetic

For full article, refer to the Persian section