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Shape-dependency of magnetic properties of FePt nanostructures
SAMARESH GUCHHAIT, D.A. FERRER, H. LIU, F. FERDOUSI, C. CORBETT, S.K. BANERJEE, Microelectronics Research Center, The University of Texas at Austin — The fabrication and magnetic properties of size- and morphology- controlled magnetic nanostructures have attracted much interest owing to their potential application in ultrahigh density magnetic recording media. Chemically ordered binary alloy L10- FePt has emerged as an ideal candidate for information storage as result of its ultrahigh uniaxial magnetocrystalline anisotropy and good chemical stability. The role of shape anisotropy in the magnetization reversal of FePt nanostructures remains as a fundamental issue to be clarified for both scientific and technological purposes. We have used wet chemistry to fabricate nanocrystals of different shapes and measured their magnetic properties using a SQUID magnetometer. Spheres have an average diameter of 3 nm, while ellipsoids are of average dimension of 3.5 nm by 2.5 nm. Rods have average diameter of 2.5 nm and length of 50-70 nm. The magnetic properties of the as-grown nanocrystals were dramatically enhanced after annealing. One can engineer the Curie temperature and coercive field of the nanostructures by tuning their shapes. Preliminary theoretical simulations enable us to qualitatively explain the dissimilar magnetic properties of these colloids.

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