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Intrinsic Magnetic Properties of fct FePt Nanocubes and Rods by Cluster Beam Deposition[1] OZAN AKDOGAN, WANFENG LI, GEORGE HADJIPANAYIS, Department of Physics and Astronomy, University of DE, Newark, DE, 19711 USA, RALPH SKOMSKI, DAVID SELLMYER, Department of Physics and Astronomy, University of Nebraska, Lincoln, NE 68588 USA — In this work, single crystal fct FePt nanocubes have been successfully produced by a cluster beam deposition technique without the need of post annealing. Particles have been deposited by DC magnetron sputtering using high Ar pressures (0.5 to 2 Torr) on both single crystal Si substrates and Au grids for the measurement of magnetic and structural properties, respectively. The nanocubes have a uniform size distribution with an average size of 6.5 nm. At 1 Torr, the particles have the fct structure with an order parameter of 0.5 and a RT coercivity of 2 kOe with high switching fields seen in the hysteresis loop. Particle size was controlled by changing the pressure and power and also by ex-situ annealing. In addition to these nanocubes, micron size rods (which consist of 20 nm nanoparticles) with the fct structure have been observed near the cluster gun. These particles show a room temperature coercivity of 8 kOe with an order parameter of 0.85. Intrinsic magnetic properties (Curie temperature, H_A, M_S and magnetic viscosity) of the nanocubes and the nanoparticles (separated from the rods) have been extensively studied and the results will be reported.

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George Hadjipanayis
Department of Physics and Astronomy,
University of DE, Newark, DE, 19711 USA

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