Novel Chemical Synthesis of FePt and CoPt Magnetic Nanoclusters

YUCHENG SUI, YAO ZHAO, MINGLANG YAN, DAVID SELLMYER, Department of Physics & CMRA, University of Nebraska — L10 ordered FePt and CoPt clusters are very promising candidates for ultrahigh magnetic recording media applications due to their large magnetocrystalline anisotropies and chemical stability. We report simple and highly efficient approaches for synthesizing FePt and CoPt nanoclusters by the pyrolysis of corresponding Fe, Co and Pt compounds in organic solvents. A mixture of Fe and Pt acetylacetonates was heated in trioctylamine, producing FePt clusters with average size about 4.2 nm and with a narrow size distribution. When the clusters with equal Fe and Pt atomic ratio were dispersed onto a silicon wafer and heated in forming gas, high-anisotropy magnetic FePt clusters with L10 chemical order were obtained. Coercivity values as high as 23 kOe were realized after annealing at 750°C for 5 min. When the pyrolysis of Co and Pt acetylacetonates mixture was carried out in trioctylamine, CoPt clusters about 4 nm and narrow size distribution also were produced. The atomic ratio of CoPt clusters can be tuned by the addition of proper reducing agents. The chemical reaction mechanism, the phase transformation and the magnetic properties will be discussed. This research is supported by DOE, NSF-MRSEC, INSIC, NRI and CMRA.

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