

Effect of activated electron beam on FCC to FCT phase transformation of FePt films

S.Y. KIM*, H.N. LEE, Y.K. KIM, T.W. KIM

Department of Advanced Materials Engineering, Sejong University, Seoul, 143-747, Korea

During the past several years, FePt films of face-centered tetragonal (FCT) structure have drawn remarkable attention because of its potential technologies for ultra-high density magnetic recording media and its large magneto-crystalline anisotropy energy density.

To make $L1_0$ structure from A1 structure in FePt films, we used a different method unlike general annealing process. General process of phase transformation in FePt films is post deposition annealing for over 2 hours in more than 400°C . But we designed the phase transformation from face-centered cubic (FCC) structure to face-centered tetragonal (FCT) structure at FePt films by using activated electron beam.

FePt films is used as alloy target which has a $\text{Fe}_{50}\text{Pt}_{50}$ proportion, and FePt 100nm deposited on SiO_2 substrate through the DC magnetron sputtering system. 400V voltage electron beam is powered into this experiment, and time range of exposed samples is from 30sec to 10min. Samples are fixed in 2×10^{-7} Torr Initial pressure and 3 mTorr working pressure, and energy is supplied to FePt films by using activated electron beam. In an X-ray diffraction (XRD) measurement of FePt films, perfect phase transformation occurs in about 10 min.

Consequently, exposed electron by using activated electron beam is shown a simple process of phase transformation in contrary with long-term annealing method.