

## Effect of elevating rate of temperature in thermal annealings on crystallographic phase transformation of FePt sputtered films

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The CuAu I type ( $L1_0$ )  $Fe_{50}Pt_{50}$  alloy films have attracted significant attention as possible high-density recording media and high energy permanent magnets because of their exceptional magnetic properties. However, the  $L1_0$  structure needs a high formation temperature of over 500 °C, and so it is limited to select substrate materials. In this study, I investigated the annealing treatment of decreasing the formation temperatures of the  $L1_0$ - $Fe_{50}Pt_{50}$  alloy films. The samples were fabricated on glass substrates (coming #7059) by radio frequency magnetron sputtering. The sputtering target was arranged uniformly Pt chip on Fe disk. Thickness of films is 8nm and 100 nm. After the depositing, the samples were annealed by using a vacuum infrared heating system. The annealing temperature and the rising speeds were varied from 400 °C to 700 °C and from 10 °C/min, to 3000 °C/min, respectively. The annealing time was fixed at 30 min. We measured the surface temperatures of samples and the temperatures of their substrates simultaneously.

Their films of high  $H_c$  over 3 kOe have  $L1_0$  crystalline structure as revealed by X-ray diffractometer. As shown in Fig. 1, the temperature of the substrates is kept at about 150 °C at the rising speed of 300 °C/min and 3000 °C/min.

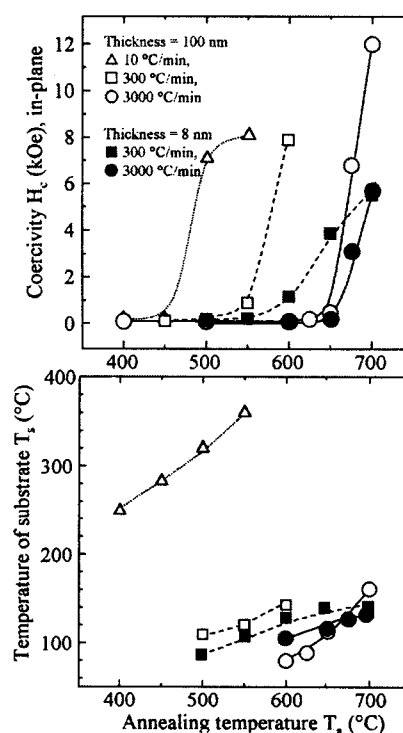


Fig.2 The coercivity of in-plane and the temperature of substrate, plotted as a function of annealing temperature.