

Saturation Magnetostriction Coefficient Measurement of CoCrPt Alloy Thin Films

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In the study of high-density magnetic recording media, it is essential to characterize the magnetoelastic properties since the magnetoelastic property could provide a new way to control the spin orientation and to stabilize magnetic anisotropy in magnetic device [1]. It is well known that the saturation magnetostriction coefficient is one of the most important parameter for evaluating the magnetic properties of ultrathin magnetic films. However, very little work has been done for measurement of magnetostriction coefficient in CoCrPt alloy film due to the limitation of measurement sensitivity. In this work, we have investigated the saturation magnetostriction coefficient in CoCrPt alloy thin films with varying the CoCrPt film thickness. The saturation magnetostriction coefficient was measured by a highly sensitive optical deflection-detecting system using a HeNe laser and one-dimensional position sensitive detector (PSD). We found that the saturation magnetostriction coefficient is increased from -8×10^{-6} to 1.4×10^{-5} with increasing the CoCrPt thickness from 400 Å to 800 Å. Interestingly, the magnetostriction coefficient was found to crossovers from negative to positive with increasing the CoCrPt thickness as shown in Fig.1. To understand the magnetostriction coefficient dependent on the CoCrPt thickness, we have investigated structural properties via x-ray diffractometry, considering the fact that the structural properties have a considerable influence on the magnetostriction coefficient of thin films. From the x-ray reflection rocking curve measurement, we found that enhancement of c-axis alignment strongly influence on the variation of saturation magnetostriction coefficient in CoCrPt alloy film.

This work was supported by the Korean Ministry of Science and Technology through the Creative Research Initiatives Project.

References

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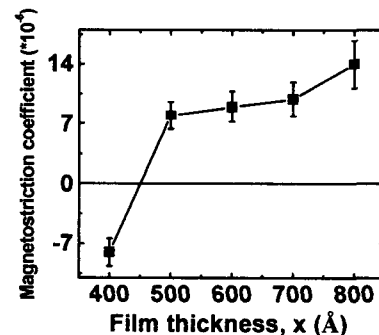


Fig. 1. Magnetostriction coefficient of x-Å $(\text{Co}_{72}\text{Cr}_{18})_{79}\text{Pt}_{21}/1300\text{-Å Ti}$ alloy films.