

A study on enhanced texture of $\text{Co}_3\text{Pt}(0002)$ by $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ layer

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The interests in perpendicular magnetic recording systems are increasing due to the limitations of current longitudinal recording technology.

The $\text{Co}_{1-x}\text{Pt}_x$ thin film has been investigated as a material for perpendicular magnetic recording media.

And it is well known that MBE-grown Co_3Pt thin film has large perpendicular magnetic anisotropy due to its ordered structure.

In this work we studied the perpendicular magnetic anisotropy of sputter-deposited Co_3Pt instead.

Magnetic layer was fabricated by DC magnetron sputtering at room temperature on 1×1.5 cm Si substrate. The composition of Co_3Pt was controlled with Pt chips on Co target.

To promote the texture of Co_3Pt . We introduced the NiFeMo and varied the thickness from 0 to 20. The structure is Si(100)/Ta 5 nm/ $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ wt% X nm/Ru 30 nm/ Co_3Pt 50 nm/Ta 5 nm.

The multilayer was analyzed with VSM(vibrating sample magnetometer) and torque magnetometer for magnetic properties and XRD(x-ray diffractometer) and TEM(transmission electron microscope) for crystal structure.

The $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ layer played an important role in controlling the perpendicular magnetic anisotropy. Only the 10 nm $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ was good enough to turn the magnetic easy axis of Co_3Pt from in-plane to out of plane. the maximum of intrinsic perpendicular magnetic anisotropy constant was about 5.5×10^6 erg/cm³. And the maximum coercivity and the squariness were 2200Oe and 0.54 respectively. According to the XRD the enhanced perpendicular anisotropy can be attributed to the enhanced texture of Co_3Pt . $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ introduced the (0002) texture to Ru and Co_3Pt . Nano-beam diffraction data from TEM revealed that Co_3Pt was mixed with hcp & fcc.

The FWHM from the rocking curves of Ru(0002) and $\text{Co}_3\text{Pt}(0002)$ was increased monotonically with increasing the $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ thickness.

In view of the experimental results, Inserted $\text{Ni}_{79}\text{Fe}_{16}\text{Mo}_5$ can be attributed to the enhanced texture of Co_3Pt .