

Optimization of Ru Intermediate Layer in CoCr-based Perpendicular Magnetic Recording Media

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In double-layer perpendicular magnetic recording media, the intermediate layer between recording layer and soft magnetic underlayer (SUL) has two important roles, serving as a template layer for growth of recording layer and controlling the magnetic spacing between the writing pole head and SUL. [1][2]

It is known that the thickness of intermediate layer should be minimized in order to maximize the writing field strength and field gradient during the writing process, but it has also been reported that the thick intermediate layer is required to guarantee the excellent magnetic properties of recording layer through the enhancement of c-axis orientation of the film.

In this work, CoCrPtB recording layer was deposited on Ru intermediate layer, which was grown on CoZrNb SUL, and the dependence of magnetic properties of recording layer on the deposition conditions of Ru intermediate layer was carefully studied in order to minimize the intermediate layer thickness without noticeable sacrifice of magnetic and microstructural properties of recording layer.

CoCrPtB with a thickness of 15 nm was sputter deposited at 300 °C and the sputtering condition of Ru layer such as thickness, substrate temperature and sputtering pressure was varied. Microstructure of the film was characterized using X-ray diffraction (XRD) and magnetic properties were measured with vibrating sample magnetometer (VSM) and magneto-optical Kerr effect (MOKE). Magnetic domain structures was observed with magnetic force microscopy (MFM) and surface morphology was analyzed with atomic force microscope (AFM).

Analysis results on microstructural study and exchange decoupling feature of CoCrPtB recording layer with variation of Ru deposition condition will be presented and the correlation between the magnetic properties of recording layer on the deposition condition of intermediate layer will be discussed in detail.

Reference

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