A novel approach for PMR media having good thermal stability and excellent read/write performance : Hybrid media

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We have achieved ultra high linear recording density over 1000kFCI and excellent signal to noise ratio (SNR) performance using CoCr based perpendicular magnetic recording(PMR) media [1]. However these media have poor thermal stability about 4% decay/decade at 1000 kFCI. In spite of good read/write performance at ultra high linear recording density, poor thermal stability becomes a critical problem to be solved. Commonly, thermally stable PMR media have higher noise level coming from high exchange coupling and lower noise PMR media have poor thermal stability due to the low anisotropy energy(Ku) at CoCr based PMR media. To overcome these dilemmas and to achieve both the high Ku and high SNR performance at ultra high linear density, we have studied for paired recording layered PMR media named as hybrid media.

PMR media were fabricated by conventional DC magnetron sputtering system with 4 cathodes on 2.5 inch glass substrate at the base pressure of below 8 $X10^{-8}$ torr . For the evaluation of magnetic and crystallographic properties, vibrating sample magnetometer(VSM), Torque magnetometer and X-ray diffractometer(XRD) were utilized. The read/write performance of PMR media were evaluated by modified ring head and merged GMR head on a GUZIK system.

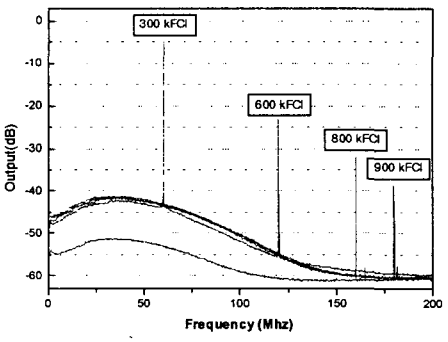

Fig.1. Spectral analysis of hybrid media using ring type head

In this research CoCrNbPt layer having low noise properties was first deposited as a 1st recording layer and then CoCrBPt layer having high Ku was grown on the 1st recording layer. To compare with conventional PMR media in the viewpoint of magnetic properties and read/write performance, two conventional PMR media of CoCrNbPt magnetic layered and CoCrBPt magnetic layered were fabricated. CoCrNbPt PMR medium shows absolutely lower noise level and CoCrBPt PMR medium shows good thermal stability.

Hybrid media show middle magnetic properties and high SNR performance as compared with two conventional PMR media and they also show good read/write performance with positive SNR at 500 kFCI linear density. Fig.1 shows spectral analysis results with the range of linear bit density from 300 kFCI to 900 kFCI. We could achieve remarkably high linear recording density of 900 kFCI with good thermal stability and excellent read/write performance using hybrid media.

References

[1] Byung-Kyu Lee, Hoon-Sang Oh, et.al, Intermag 2002, April 28- May2, DB-10