IMPROVING THE HIGH-FREQUENCY MAGNETIC FORCE MICROSCOPY TECHNIQUE BY MEANS OF FERRITE-COATED CANTILEVERS.

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High-frequency magnetic force microscopy (HF-MFM) is employed for the evaluation of the high-frequency performance of harddisk write heads [1]. The effective time-averaged force sensed by the cantilever yields informations about the local stray field around the magnetic poles of the write head on the air-bearing surface. To improve the performance of the HF-MFM imaging technique, we tested the performance of MFM cantilevers coated with two types of ferrites: (Ni,Zn)-ferrites as well as Co_2 Z-type hexaferrite with the composition $Ba_3Co_2Fe_{24}O_{41}$ (BCFO). The films were prepared by RF sputtering onto commercial, micromachined Si-cantilevers with a typical thickness of 50 nm [2]. The HF-MFM images obtained by ferrite-coated cantilevers are found to reveal more details of the magnetic field distribution around the write heads up to the GHz range in comparison to those obtained by conventional CoCr-coated MFM cantilevers. In this contribution, we compare the HF-MFM images of harddisk write heads (Seagate) obtained by these three cantilever types. The ferrite-coated cantilevers were found to produce increased HF-MFM signals up to the GHz regime, where the contrast in the images by the conventional cantilevers reduce strongly at frequencies above 500 MHz. The improvement of the HF-MFM performance due to the ferrite-coated cantilevers is discussed by considering the imaging mechanism of the HF-MFM technique.

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[1] M. Abe and Y. Tanaka, IEEE Trans. Magn. 38 (2002) 45.
[2] M. R. Koblischka et al. Jpn. J. Appl. Phys., in print.