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## Magnetic Force Microscopy Observation of Perpendicular Recording Head Remanence

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In this work, magnetic force microscopy (MFM) was utilized to observe the magnetic write head remanence, which is the remaining out-of-plane magnetic field on magnetic write heads after a write current is turned off. This remnant field can write unwanted tracks or erase written tracks on a magnetic media. The write head remanence can also occur from device and slider fabrication, either by applying current to the write coil during the inspection or biasing the external magnetic field to magnetic recording heads. This remanence can attract magnetic nanoparticles, which is suspended in cleaning water or surrounding air, and cause device contamination. Samples used in this study were magnetic write heads that were etched with two different gas etching recipes. MFM images were used to examine locations of the remnant field on the surface of magnetic recording heads. Experimental results revealed that the remanence occurred mostly on the shield and the initial direction of magnetic dipoles has the influence on the location of the write head remanence. In addition, it was found that different etching gases have the effect on the pole tip remanence.

**keywords:** remnant field, pole tip remanence, perpendicular magnetic write heads, MFM

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