

## **FeMn thickness effect on the domain structure of exchange biased Permalloy thin films**

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Exchange bias in ferromagnetic/antiferromagnetic systems has been used in magnetoresistive sensors to stabilize or bias ferromagnetic thin films[1]. Exchange coupling between FeMn and permalloy(Py) layers is widely used to fabricate sensitive spin valve MR head. The magnetic properties of exchange biased Py layer strongly depend on the thickness and microstructure of antiferromagnetic layer.

We have been investigated Py/FeMn/Py multilayers which showed different exchange bias at both interfaces. The exchange bias of top Py layer strongly depends on the thickness of FeMn layer and interface structure. The coercivity of top Py layer showed peak point at the thickness of maximum exchange bias and then decreases at thicker FeMn samples. These characteristics could be related with the magnetization process and domain structures of Py films. Magnetic force microscope (MFM) has been used to investigate the domain state of exchange biased ferromagnetic layers[2].

In this research, we investigate the relation between the FeMn thickness and the domain structure of top Py layers. When the thickness of FeMn layer is less than 3 nm, long and parallel domains are formed with 180° domain wall and these are similar to those of Py layer. When the FeMn thickness increases, the domain pattern complicates and many pinning sites are formed along with exchange bias. Therefore there should be locally strong interaction between Py and FeMn. These pinning sites also could explain the increase of coercivity of top Py layers.

### **References**

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