

Perpendicular magnetic anisotropy induced by composited antiferromagnetic films

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Abstract

Perpendicular magnetic anisotropy (PMA) plays an essential role in the modern high-density magnetic recording technology. This work reports the effects of triggering PMA of ferromagnetic (FM) film through applying composited antiferromagnetic (AFM) films with different spin structures. According to the previous studies [1, 2], fcc-FeMn films with three-dimensional AFM structure could induce PMA of FM film through collinear-like coupling from established out-of-plane components of the interfacial moments.

By contrast, e-fct Mn film with in-plane layered spin structure could engender relatively weaker PMA through noncollinear coupling established between the volume moments and out-of-plane orientated uncompensated moments of AFM films. In the present work, we show that the composited AFM layers of Mn/FeMn or FeMn/Mn films can also trigger PMA of FM films. We demonstrate that AFM layer with established long-range AFM ordering at the volume could support or alter the magnetic structure of the thin AFM film at the AFM/FM interface through magnetic proximity effects, enabling a flexible control of PMA on the FM films.

Keywords: composited antiferromagnetic films, perpendicular magnetic anisotropy

References

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