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# Columnar structural FePt films with good perpendicular anisotropy induced by tuning the crystal structure of doping materials

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## Abstract

Crystalline ZrO<sub>2</sub> doping would degrade the perpendicular texture of FePt films due to the epitaxial growth of FePt (200) textured phase on the tetragonal (002) textured ZrO<sub>2</sub>. In the present paper, crystalline HfO<sub>2</sub> was used to replace crystalline ZrO<sub>2</sub> as the crystalline doping material and FePt media with columnar structure and good perpendicular anisotropy were achieved. It is found that HfO<sub>2</sub> crystallized on TiON intermediate layer presented the coexistence of both monoclinic and tetragonal phase. The extremely large lattice mismatch strain (around 25-28%) between FePt and HfO<sub>2</sub> would prohibit the (200) or (001) epitaxial growth of FePt phase on HfO<sub>2</sub>. This would cause FePt-HfO<sub>2</sub> film to have better (001) texture and perpendicular anisotropy compared to FePt-ZrO<sub>2</sub> films. By tuning the crystal structure of doping crystalline phase material, columnar structural FePt films with better perpendicular anisotropy could be obtained, which may offer a method for the application of FePt media in heat assisted magnetic recording.

Keywords: Crystalline Oxide doping; Epitaxial growth; Columnar structure

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