Graded Anisotropy FePtCu Thin Films
A Solution to the Magnetic Recording Trilemma?

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The roadmap to magnetic recording media with bit densities of 1 Tbits/in.^{2} and beyond is plagued by a so-called "trilemma" where the thermal stability and signal-to-noise ratio must be simultaneously balanced with writabilty. While high anisotropy materials improve thermal stability, the magnetic fields required for switching exceed the capabilities of the write head. Recently graded media [1], where the anisotropy is varied continuously between hard and soft layers, has been proposed to decrease the necessary write field while maintaining thermal stability.

Continuously graded anisotropy FePtCu films are explored [2]. First, a compositional gradient is achieved by varying the Cu concentration from Cu-rich $(Fe_{53}Pt_{47})_{70}Cu_{30}$ to Cu-free $Fe_{53}Pt_{47}$ during film deposition. Then, major loop, remanence curve, thermal stability, and first-order reversal curve (FORC) analyses are employed to study the evolution of the induced anisotropy gradient as a function of post-annealing temperature. Furthermore, the inherent surface sensitivity of the magneto-optical Kerr effect (MOKE) is combined with FORC analysis in order to provide a relatively easy, comprehensive, and powerful analysis tool [3].

Finally, the experimental procedure presented here can be extended to other, e.g., perpendicular and/or granular, material systems where a graded anisotropy is desired.

References

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