Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Tailoring anisotropy in (001) oriented $(Fe_{1-x}Cu_x)_{55}Pt_{45}$ films DUSTIN GILBERT, Physics Department, University of California, Davis, CA 95616 USA, LIANG-WEI WANG, Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan, TIMOTHY KLEMMER, JAN-ULRICH THIELE, Seagate Technology, Fremont, CA 94538 USA, CHIH-HUANG LAI, Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan, KAI LIU, Physics Department, University of California, Davis, CA 95616 USA — High anisotropy magnetic materials are central to future spintronic and recording technologies. Binary alloy FePt in its fct-$L1_0$ phase offers ideal magnetic properties, but usually requires high temperature annealing. Alloying with Cu has been suggested to lower the annealing temperature. However, it has been difficult to grow oriented films and prior studies have often focused on non-ideal compositions. In this work we investigate $(Fe_{1-x}Cu_x)_{55}Pt_{45}$ films – an ideal ratio for the $L1_0$ phase. Fully ordered films with a strong (001) texture were grown by an atomic-scale multilayer sputtering method and rapid thermal annealing at 400 °C. The room-temperature deposition, low annealing temperature, and lack of a seed layer shows the strength of this technique. An increase in the tetragonal lattice distortion and fragmentation of the microstructure [while retaining the (001) texture] were observed with added Cu. Magnetic properties were evaluated and show a strong perpendicular anisotropy. The Cu inclusion is demonstrated to decrease T_C without hefty sacrifices to M_S and K_U, making such films ideal for heat-assisted magnetic recording.

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Date submitted: 19 Nov 2012 Electronic form version 1.4