

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Effect of Hard Layer Demagnetization on the Magnetization Reversal of Epitaxial Fe/SmCo Spring Magnets¹ KAI LIU, J.E. DAVIES, UC - Davis, E.E. FULLERTON, Hitachi Global Storage Tech, J.S. JIANG, S.D. BADER, Argonne National Lab — In epitaxial Fe/SmCo, a classical spring magnet, irreversible magnetization reversal is observed once the SmCo hard layer starts switching [1,2]. To distinguish the soft and hard layer reversibility separately, we studied the effect of partial SmCo layer demagnetization on the reversal behavior of the entire bilayer using the first and second order reversal curve methods (FORC and SORC, respectively). The FORC distribution [2,3] shows two distinct features during the hard layer reversal: a negative/positive pair of features and a single positive peak. The negative/positive pair is from the soft Fe layer reversal and is a manifestation of the interlayer exchange coupling. The single positive peak occurs at larger applied fields and corresponds to the reversal of the hard SmCo layer. A SORC measurements were done at several reversal fields to determine the reversibility along different FORCs. We observe that the Fe layer remains mostly reversible. The partially demagnetized SmCo layer is the main source of irreversibility, particularly when the applied field approaches the hard layer nucleation/saturation field. [1] Fullerton, PRB 58, 12193 (1998). [2] Davies, et al, APL 86, 262503 (2005). [3] Davies, et al, PRB 70, 224434 (2004); PRB 72, 134419 (2005).

¹Work is supported by ACS-PRF, Alfred P. Sloan Foundation and DOE (BES-MS contract #W-31-109-ENG-38)

Joseph Davies
University of California, Davis

Date submitted: 05 Dec 2005

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