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Element- and depth resolved magnetic study of Sm-Co/Fe exchange spring magnet films with enhanced effective coupling[1] Y. CHOI, J. S. JIANG, J. E. PEARSON, S. D. BADER, Argonne National Laboratory, Y. DING, Z. L. WANG, Georgia Institute of Technology , A. ZAMBANO, M. MURAKAMI, I. TAKEUCHI, University of Maryland, J. P. LIU, University of Texas at Arlington — Sm-Co/Fe exchange-spring bilayers with intermixed interfaces exhibit enhanced exchange coupling effectiveness [1]. We have examined the element- and depth-resolved magnetization reversal process using x-ray resonant magnetic scattering (XRMS) magnetometry. The XRMS measurements indicate significant Co diffusion into the Fe layer, and electron microscopy observations give consistent results in the composition profiles. Using model concentration profiles in combination with micromagnetic codes, we simulated demagnetization curves that are in good agreement with the XRMS results. The results reveal that the enhanced exchange coupling effectiveness is due to the intermixing in the interfacial region and that the diffused Co behaves similarly to the surrounding Fe. [1] J. S. Jiang et al., Appl. Phys. Lett. 85, 5293 (2004).

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