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Interplay between reversal asymmetry, training, and anisotropy, in epitaxial NiMn/Ni exchange biased bilayers M.S. LUND, C. LEIGHTON, University of Minnesota — We have employed electron and x-ray diffraction, x-ray reflectivity, conventional magnetometry, and polarized neutron reflectivity to probe epitaxial NiMn/Ni bilayers. Binary alloys such as NiMn often require an annealing procedure to induce AF ordering which leads to interdiffusion at the AF/F interface and a subsequent, and poorly understood, reduction in exchange bias. Our previous work with neutron reflectivity revealed a 35 Å interdiffused region that contains competing AF and F interactions resulting in a very unusual temperature dependant magnetic interface location (M.S. Lund, M.R. Fitzsimmons, S. Park, and C. Leighton, APL 2004). In this work we find that at low temperatures there is a rapid divergence of the exchange bias field, coincident with the onset of strong training, an obvious reversal asymmetry, and the appearance of higher order induced anisotropies. We show in a simple way that the rapid increase in bias field, strong training, and reversal asymmetry are all consequences of the induced anisotropies. In addition, we are able to demonstrate in a single sample that uniaxial anisotropy favors low training, while biaxial anisotropy results in large training, confirming a recent theoretical prediction (A. Hoffmann, PRL 2004). Research was supported by NSF MRSEC.

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