Abstract Submitted
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Magnetization profiles in Fe/SmCo Spring Magnets with Graded Interfaces[1] Y.H. LIU, J.S. JIANG, S.G.E. TE VELTHUIS, Argonne National Laboratory, H. AMBAYE, A. PARIZZI, Oak Ridge National Laboratory — To understand the improved effectiveness of the exchange coupling in Fe/SmCo spring magnets with a graded interface, we have determined the magnetic structure with Polarized Neutron Reflectometry (PNR). PNR confirms that the Fe/SmCo interface is greatly intermixed. Magnetic hysteresis curves show well-separated coercive fields for the soft phase H_C^S and the hard phase H_C^H. Large spin-flip (SF) scattering reveals a twisted magnetic structure at H_C^S. SF scattering initially decreases slightly when H increases, then drops dramatically when $H > H_C^H$. This suggests that the twisted region first becomes more narrow and then suddenly diminishes once the SmCo layer switches. Combining 1D micro-magnetic simulations and PNR, we find that the SmCo layer has a much lower average in-plane anisotropy than the bulk. The scattering along the recoil loops strongly depends on the starting field, but in all cases a collinear magnetic structure is indicated at low fields. Overall, the magnetization reversal is mostly reversible rotation for $H < H_C^H$, but an abrupt irreversible switching happens when $H > H_C^H$.

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