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Spin-reorientation transition in exchange-coupled (Pt/Co)n/Sm-Co multilayers JIAN ZHOU, RALPH SKOMSKI, DAVID SELLMYER, Department of Physics and Astronomy and Center for Materials Research and Analysis, University of Nebraska, Lincoln, NE 68588 — Exchange coupling through Pauli-paramagnetic spacer layers is a scientifically interesting phenomenon with applications in sensors and magnetic recording. We have investigated the interplay between interlayer exchange and competing anisotropies. Due to interface anisotropy, the $(Pt/Co)_n$ multilayer exhibits an out-of-plane easy axis (perpendicular anisotropy). The Sm-Co layer has in-plane anisotropy. The exchange between the $(Pt/Co)_n$ and Sm-Co layers is tuned by varying the thickness of the Pt spacer layer. In the $(Pt5Å/Co4Å)_n$/Sm-Co40Å system, we observe a spin-reorientation transition at a spacer-layer thickness of somewhat less than 5 Å. Above this threshold, the Pt/Co retains its out-of-plane anisotropy, and a low-temperature coercivity of 3 kOe is obtained. Below the threshold, the Pt-Co film is exchange-coupled to the Sm-Co layer and the spin structure of $(Pt/Co)_4$ changes, with a low-temperature coercivity of 200 Oe. The transition is also seen in the hysteresis-loop shape. The samples exhibit a low-temperature loop shift after field cooling, which is not observed after zero-field-cooling. The behavior of the film is modeled and discussed as a function of the Pt/Co bilayer period n and of the spacer-layer thickness. This research is supported by DOE, ARO, the W. M. Keck Foundation, INSIC, and CMRA.

Department of Physics and Astronomy and Center for Materials Research and Analysis, University of Nebraska

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