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Exchange bias of conetic thin films[1] TATIANA EGGERS, HILLARY KIRBY, PRIYANGA JAYATHILAKA, SCOTT CAMPBELL, CASEY MILLER, University of South Florida — In this work, we study the exchange bias and coercivity of $Ni_{77}Fe_{14}Cu_5Mo_4$ (Conetic, also known as mu-metal) exchange coupled with FeMn as functions of Conetic thickness and buffer layer material. The samples studied were BL(30nm)/Conetic(9nm-30nm)/FeMn(10nm)/Ta(5nm), where BL = Cu or Ta. All samples were grown by magnetron sputtering in a deposition field of ∼150 Oe during growth to set the exchange bias axis. Room temperature hysteresis loops were measured by a magneto-optical Kerr effect magnetometer as a function of applied-field angle. For each variety of sample, the exchange bias and coercivity were inversely proportional to Conetic thickness. With Cu buffer layers grown on Si, the H_{eb} decreased from 300 Oe to 62 Oe, and H_c decreased from 99 Oe to 9 Oe. Similar results were found when the Cu buffer layer was grown on SiOx, though the maximum coercivity was only 67 Oe. For the samples grown on Si(001)/Ta(5nm), the exchange bias decreased from 80 Oe to 14 Oe, while the coercivity increases only slightly from 2 Oe to 10 Oe. These results indicate a trade-off between preserving the softness of the ferromagnet and having a large exchange, which may be useful for tuning the performance of low-field sensing materials

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