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Interfacial magnetic anisotropy in $Ta/Co_xFe_{100-x}/MgO$ films for Co compositions[1] SUNG-MIN AHN, GEOFFREY BEACH, Massachusetts Institute of Technology — To realize promising devices for high tunnel magnetoresistance and high-efficiency current-driven domain wall (DW) motion, it is crucial to optimize perpendicular magnetic anisotropy (PMA) for Ta/Co(Fe)/MOx trilayers where M is a metal such as Al, Mg, Ta, etc. Here, the PMA in Ta/Co_xFe_{100-x} (CoFe)/MgO films for alloy compositions spanning pure Co to pure Fe has been studied in order to investigate the role of chemical composition in the onset of perpendicular magnetic anisotropy at the CoFe/MgO interface. Out-of-plane magnetization is not observed in Ta/Fe/MgO (x=0) and Ta/Co/MgO (x=100), for all ranges of CoFe thickness (t), but a t-dependent crossover between in-plane and out-of-plane anisotropy is found for x=20, 50, and 80. Interestingly, effective magnetic anisotropy K_u as well as interfacial anisotropy K_i are maximized for $Co_{50}Fe_{50}$ at a fixed t=0.8 nm. The results suggest that the degree of filling of valence bands in the CoFe adjacent to the interface, which determines the relative population of the anisotropic *d*-bands, plays an important role in the interfacial anisotropy brought on by CoFe-O hybridization at the metal/oxide interface.

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