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Tuning Interfacial Dzyaloshinskii-Moriya Interactions in Ta/CoFe/MgO through Annealing PARNIKA AGRAWAL, SATORU EMORI, DAVID BONO, GEOFFREY BEACH, Massachusetts Inst of Tech-MIT — Out-of-plane magnetized ultrathin ferromagnets interfaced between a heavy metal and an oxide exhibit anomalously efficient current-induced domain wall (DW) motion. In these ultrathin ferromagnets, the interfacial Dzyaloshinkii-Moriya interaction (DMI) stabilizes Néel DWs with a fixed chirality [1] which permits the Spin Hall Effect (SHE) to drive the DWs uniformly. The magnitude and direction of DMI is a strong function of the material composition and thickness of the heavy metal underlayer, sharpness of the interface, temperature and other processing parameters [2,3]. Here we quantify the DMI effective field in Ta/CoFe/MgO films by studying the asymmetry of expansion [4] of a circular domain in the presence of in-plane bias fields. We show that while the DMI is relatively weak, it can be enhanced by annealing, and we describe the correlation between DMI and interfacial perpendicular magnetic anisotropy as a function of annealing conditions. These results provide new insights into the interfacial origin of the DMI. [1] A. Thiaville, et al., EPL **100** 57002 (2012) ;[2] S. Emori, et al., arXiv:1308.1432v1 (2013) ; [3] S. Emori, et al., Nat. Mat. **12**, 611 (2013) ; [4] S.-G. Je, et al., arXiv:1307.0984v1 (2013)

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