Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Strong perpendicular magnetic anisotropy at FeCoB/MgO interface with an ultrathin HfOx insertion layer YONGXI OU, DANIEL RALPH, ROBERT BUHRMAN, Cornell Univ — The realization of robust perpendicular magnetic anisotropy (PMA) in heavy metal(HM)/FeCoB/MgO thin-film heterostructures has enabled a pathway for the implementation of high density memory elements based on perpendicularly magnetized tunnel junctions, and also provides a platform for the study and control of domain walls and of novel magnetic chiral structures such as skyrmions in nanowire structures. Here we report on the achievement of more robust PMA in Ta/FeCoB/MgO heterostructures by the insertion of an ultrathin HfOx passivation layer at the FeCoB/MgO interface. This is accomplished by depositing one to two atomic layers of Hf onto the FeCoB before the subsequent rf sputter deposition of the MgO layer, which fully oxidizes the Hf layer as confirmed by X-ray photoelectron spectroscopy measurements. The result is a strong interfacial perpendicular anisotropy energy density as large as 1.7 erg/cm^2 without any post-fabrication annealing treatment. Similar results have been achieved with the use of W and Pt HM base layers. This work broadens the class and enhances the capabilities of PMA HM/FM heterostructures for spintronics research and applications.

Yongxi Ou
Cornell Univ

Date submitted: 10 Nov 2016 Electronic form version 1.4