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Oxygen control of perpendicular magnetic anisotropy and spin-orbit torques in Ta/ CoFeB/ MgO trilayer HARSHA KANNAN, YUNPENG CHEN, KEVIN HAUGHEY, JOHN XIAO, Univ of Delaware — Current-induced magnetization switching allows the integration of magnetic capabilities into electric circuits. The spin-orbit interaction in heavy-metal/ferromagnetic heterostructures are of profound interest, since they provide an efficient way to manipulate the magnetization, via strong current driven spin orbital torques (SOTs). Materials possessing perpendicular magnetic anisotropy (PMA) are the preferred choice for the fabrication of memory devices since its magnetization can be switched with a small current density. Here we present the Oxygen control of perpendicular magnetic anisotropy of Ta/ CoFeB/ MgO, which is accomplished by fabricating a thin wedge layer of Al on top of the MgO layer followed by oxidation in Oxygen plasma. Thinner end of the Al wedge will be over oxidized and the thicker end will be under oxidized, hence degree of oxidation varies from thinner to the thicker end. This in effect provides a means to control the Oxygen content at the CoFeB/ MgO interface and to control the perpendicular magnetic anisotropy. We will further discuss the dependence of SOTs, measured with adiabatic harmonic Hall technique on varying PMA.

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