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Enhanced Tunneling Magnetoresistance in Voltage-controlled CoFeB/MgO Junctions[1] HAMID ALMASI, MENG XU, CHRISTIAN GENTRY, DI YU, TY NEWHOUSE-ILLIGE, Department of Physics, University of Arizona, Tucson, Arizona 85721, USA, Y.H. LIU, Materials Science Division, Argonne National Laboratory, Argonne, IL 60439, USA, J.W. FREELAND, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439, USA, S.G.E. TE VELTHUIS, Materials Science Division, Argonne National Laboratory, Argonne, IL 60439, USA, WEIGANG WANG, Department of Physics, University of Arizona, Tucson, Arizona 85721, USA — Perpendicular magnetic anisotropy (PMA) at the CoFeB/MgO interface originates from the hybridization of d orbitals of Fe and Co and the Pz orbital of Oxygen. Due to different electronic band structures, the hybridization of the *d* orbitals of Fe and Co is likely different, therefore contributing unequally to the total PMA. This difference has been probed by an X-ray magnetic circular dichroism (XMCD). The orbital moment of Fe was found to be much larger than that of Co by XMCD.These results demonstrated that Fe contributes most to the PMA at the interface. MTJs with Fe-rich electrodes were fabricated and a substantially larger PMA was achieved. With further optimization in post-growth thermal annealing, we have achieved over 150% TMR in these voltage-controllable CoFeB/MgO MTJs.

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