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Ferromagnetic thickness dependence of current-driven spin-orbit torques in different ferromagnetic and heavy metal bilayers JUN WU, University of Delaware, XIN FAN, University of Denver, TAO WANG, YUNPENG CHEN, Q. JOHN XIAO, University of Delaware — The spin-orbit torques in ferromagnetic (FM) and heavy metal (HM) bilayers have attracted extensive research interests recently because of the rich physical phenomena and potential applications. We measured the effective fields of field-like torques in Ni/Pt, NiFe/Pt and CoFeB/Pt bilayer systems by the second-order planar Hall effect. When the FM layers are less than 2nm, the effective fields increase rapidly with decreasing the FM layer thickness for all three different FM layers. Among the three FMs, the effective field in Ni is largest, followed by NiFe, then CoFeB. Above 2nm, the effective fields decrease much slower with increasing the FM layer thickness and level off to the Orested field due to the current in the Pt layer. Through FM layer thickness dependence of the field-like torque study, we found that the spin dephasing length in the FM layer, which is related to the scattering in FM layer, plays an important role in determining the magnitude of field-like spin-orbit torque in FM/HM bilayers.

Jun Wu
University of Delaware

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