4CF14-2014-000099

Abstract for an Invited Paper
for the 4CF14 Meeting of
the American Physical Society

Study of spin-orbit torques in magnetic bilayer

XIN FAN, University of Denver

In recent years, the spin-orbit interaction in magnetic/nonmagnetic bilayer has attracted intensive attention, which opens a new path to electrically control magnetism. The spin-orbit interaction describes the coupling between electron charge and spin, which is the fundamental building block of magnetism. It is found that an in-plane current through the bilayer can generate a spin-orbit torque that manipulates the magnetization of the magnetic layer [1,2]. The efficiency of this effect mainly depends on the property of the nonmagnetic layer, which is typically stronger in materials with strong spin-orbit interactions. In this talk I will review the recent development and discuss about some controversies in this field. I will also present our recent efforts on the accurate detection of the spin-orbit torque [3].

[1] Liu, L. *et al.* Spin-Torque Switching with the Giant Spin Hall Effect of Tantalum. *Science* **336**, 555-558 (2012).
[2] Miron, I. M. *et al.* Perpendicular switching of a single ferromagnetic layer induced by in-plane current injection. *Nature* **476**, 189-U188 (2011).
[3] Fan, X. *et al.* Quantifying interface and bulk contributions to spin–orbit torque in magnetic bilayers. *Nature Communications* **5**, 3042 (2014)