Department of **Materials Science & Engineering** seminar series 2019

Current-induced field-free magnetization switching in metallic heterostructures

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Venue: **EA-06-03**

Abstract

Current-induced spin-orbit torques (SOT) are attracting great interest due to the manipulation of magnetization in heavy metal (HM)/ ferromagnetic metal (FM) heterostructures with perpendicular magnetic anisotropy (PMA). The SOT-induced magnetization switching is promising for three-terminal spintronics devices that are capable of fast speed and high reliability. The damping-like torque, which is responsible for the SOT switching, is symmetric with respect to the magnetization directions. As a result, an additional in-plane magnetic field is always required to break the symmetry for deterministic switching, which limits the scalability of devices. Here we demonstrate the observation of current-induced switching of perpendicular magnetization with the absence of an external magnetic field in a novel metallic bilayer structure. The field-free switching of magnetization is ascribed to the combination of damping-like effective field and current-induced "exchange field" which will not degrade with time. Compared with previous approaches of field-free switching, this work can contribute to a robust SOT switching with excellent endurance.

Zhou Chenghang received his M.Sc. degree in the Department of Physics at the National University of Singapore. He is currently a Ph.D. candidate in the Department of MSE under the supervision of Prof. Chen Jingsheng, focusing on spintronics. His current research focuses on SOT switching in new perpendicular magnetic materials.

ALL ARE WELCOME!

Host: A/P Xue Junmin