SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Faculty of Engineering
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Area: Microelectronic Technologies & Devices

Host: Assoc Prof Mansoor Bin Abdul Jalil

TOPIC	**:**	**Field-free switching induced by spin Hall and anomalous Hall effects**
SPEAKER	**:**	**Ms Sun Chi** **Graduate student, ECE Dept, NUS**
DATE	**:**	**12 May 2020, Tuesday**
TIME	**:**	**2pm to 3pm**
WEBINAR	**:**	**https://nus-sg.zoom.us/j/4496658606** **Meeting ID: 449 665 8606**

ABSTRACT

Spin-orbit coupling (SOC) in nonmagnetic heavy metals (HMs) gives rise to the spin Hall effect (SHE), which is widely used to switch perpendicularly magnetized structures with an assistive magnetic field. In a similar manner, the anomalous Hall effect (AHE) arising from bulk SOC in ferromagnets (FMs) can also induce spin polarization. We theoretically show how both SHE and AHE can be used to realize field-free switching of perpendicular magnetization in FM1(fixed)/HM/FM2(free) trilayer structures. We calculate the resulting spin torque due to SHE (in the HM) and/or AHE (in the fixed FM1) analytically and numerically, and perform macrospin switching simulation without an assistive magnetic field. While it is understandable that AHE can achieve field-free switching due to the out-of-plane polarization it generates, rather surprisingly, field-free switching of perpendicular magnetization can also occur in the sole presence of SHE when the fixed FM1 has an out-of-plane magnetization. In addition, the AHE and SHE can be combined constructively for magnetization switching by having spin Hall and anomalous Hall angles of opposite signs.

BIOGRAPHY

Sun Chi is a PhD student in Department of Electrical and Computer Engineering, National University of Singapore. Her research interests focus on the spin transport theory.

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