NUS National University of Singapore

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

Presents

Current-induced spin-orbit torque in antiferromagnetic iridium manganese

by *Zhou Jing*

Date: 9 April 2019 (Tuesday)
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Venue: E5-03-19

Abstract

Spin-orbit torque (SOT) offers promising approaches to developing energy-efficient memory devices by electric switching of magnetization. Comparing to other SOT materials, metallic antiferromagnet enriches the sources of SOT, potentially allows the control of SOT efficiency via its magnetic structure. However, the origin of SOT generated by antiferromagnet is still a subject of debate today. There are also technical difficulties in preparing metallic antiferromagnets with well-defined magnetic and crystal structures. In this work, we fabricate successfully epitaxial IrMn thin films in three phases, namely the γ, L10 and L12 phases, and systematically studied their magnetic and crystal structures. Single-crystal IrMn exhibits distinct phase-dependent SOT efficiencies that are significant larger than its polycrystalline films. Moreover, we show that the room-temperature magnetic structure of epitaxially grown L10-IrMn is distinct from the widely presumed bulk one. Its unconventional magnetic structure induces a large isotropic bulk contribution to the SOT efficiency and an anisotropic interfacial contribution of comparable magnitude, where the latter depends strongly on the electric current direction in the film plane. Our findings sheds light on the critical roles of bulk and interfacial antiferromagnetism to SOT generated by metallic antiferromagnets.

Speaker *Zhou Jing*

Biography

Zhou Jing received his B.Eng. and B.A. from National University of Singapore in 2014. He has joined Assoc. Prof. Chen Jingsheng's research group as a Ph.D. candidate since 2015. His research interest includes magnetic materials for novel spintronic applications, ferromagnetic resonance and automation of electric transport measurement systems.

ALL ARE WELCOME!

Prof Chow Gan Moog Host