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

Spin-Orbit Torque in Chemically Disordered and $L1_1$-Ordered $Cu_{100-x}Pt_x$

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Date: 17rd Oct 2019, Thursday
Time: 3:30 to 4:00 pm
Venue: EA-06-03

Abstract

The spin-orbit torque (SOT) has attracted increasing attention due to its potential application in energy-efficient devices. The binary alloys with heavy elements have been considered promising candidates for SOT application due to the tuneable spin Hall effect. In light of previous studies, the effect of crystalline structure on spin Hall effect in non-magnetic alloys has not been thoroughly studied. Here, we present a systematic investigation of the SOTs in chemically disordered $Cu_{100-x}Pt_x$ and $L1_1$-$Cu_{50}Pt_{50}$ by spin torque ferromagnetic resonance technique. The results indicate that both the atomic concentration and the degree of the chemical ordering influence substantially the SOT efficiency of the CuPt alloys. In chemically disordered $Cu_{100-x}Pt_x$, the primary mechanism of spin Hall effect changes from extrinsic to intrinsic one when the Pt concentration is increased to larger than 80%. In $L1_1$-$Cu_{50}Pt_{50}$ with weak chemical ordering, the side jump and intrinsic mechanisms dominate, whereas the skew scattering mechanism dominates for strong chemical ordering. This work contributes to a basic understanding of the crystalline structure-dependent spin Hall effect and provides a new perspective to control the SOTs in alloys.

Shu Xinyu received his bachelor's degree in Department of Materials and Engineering (MSE) from Harbin Institute of Technology and his Master's degree in Institute of Microstructure and Property of Advanced Materials from Beijing University of Technology. He is currently a PhD candidate in Department of MSE under A/P Chen Jingsheng, focusing on spintronics. His current research focuses on the modification of spin-orbit torque and magnetoelectric transport in materials.

ALL ARE WELCOME!

Host: A/P Xue Junmin