Fengyuan Yang, J Material Sci Eng 2015, 4:3
http://dx.doi.org/10.4172/2169-0022.C1.031

OMICS International
conferenceseries.com

Pure spin current in a broad range of materials generated by YIG-based spin pumping

Fengyuan Yang
The Ohio State University, USA

Spintronics relies on the generation, transmission, manipulation, and detection of spin current mediated by itinerant charges or magnetic excitations. Ferromagnetic resonance (FMR) spin pumping is a powerful technique in understanding pure spin current. Building on the high-quality $Y_3Fe_5O_{12}$ (YIG) films grown by our sputtering technique and the large inverse spin Hall Effect (ISHE) signals enabled by these films, we have characterized spin currents in several classes of materials with different magnetic structures, including: Nonmagnetic (NM) metals, ferromagnetic (FM) metals, nonmagnetic insulators, and antiferromagnetic (AF) insulators. The spin Hall angles determined for a series of *3d, 4d,* and *5d* NM metals show that both atomic number and *d*-electron count play important roles in spin Hall physics. By inserting an insulating spacer of various materials between YIG and Pt, we are able to probe the mechanism of spin pumping and the spin propagation. Using several NM insulating spacers, we observed exponential decay of the ISHE voltages in YIG/spacer/Pt trilayers, demonstrating dominant role of exchange coupling in spin pumping. Strikingly, we achieved robust spin transport from YIG to Pt across AF insulators, which initially enhances the ISHE signals and can transmit spin currents up to 100 nm thickness, demonstrating highly efficient spin transport through an AF insulator carried by magnetic excitations.

Biography

Fengyuan Yang received his PhD in 2001 from The Johns Hopkins University. He is now an Associate Professor in the Department of Physics at The Ohio State University. He is the Chair of the Users Committee of the NanoSystems Laboratory (NSL) and the Associate Director of the Institute for Materials Research (IMR) at The Ohio State University. He has published more than 85 papers in peer-reviewed journals.

yang.1006@osu.edu

Notes: