

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Observation of thermal spin transfer torque via ferromagnetic resonance in magnetic tunnel junctions¹ ZHAOHUI ZHANG, LIHUI BAI, CAN-MING HU, Department of Physics and Astronomy, University of Manitoba, XIAOBIN CHEN, HONG GUO, Centre for the Physics of Materials and Department of Physics, McGill University, XIAOLONG FAN, DESHENG XUE, The Key Lab for Magnetism and Magnetic Materials of Ministry of Education, Lanzhou University, DIMITRI HOUSSAMEDDINE, Everspin Technologies — The temperature gradient driven spin-transfer torque, called the thermal spin-transfer torque (TSTT) attracts people's attention since it has potential in magnetization switching by utilizing wasted heat as well as in the study of spin transportation. We observed the effects of TSTT on magnetic tunnel junction (MTJ) via analysis of the ferromagnetic resonance (FMR) spectra. We used an external laser beam to heat the MTJ in order to establish a temperature gradient effectively. A TSTT was driven by the temperature gradient and applied to the magnetization of the free FM layer of the MTJ. By measuring and analyzing the FMR spectra, after excluding the effects caused by the temperature rise, we conclude that the FMR line-shape change is a result of the TSTT generated by a temperature gradient via laser heating. The most interesting result is that the angular dependence of the TSTT and DC-bias spin-transfer torque are very different. A modified or new theory may be needed to explain this in the future.

¹NSERC, CFI, URGP, CSC, Faculty of Graduate Studies of University of Manitoba, UMGSA, Faculty of Science of University of Manitoba

Zhaohui Zhang
Department of Physics and Astronomy, University of Manitoba

Date submitted: 04 Nov 2015

Electronic form version 1.4