Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Antiferromagnet controlled tunneling anisotropic magnetoresistance[1]

CHENG SONG, YUYAN WANG, FENG PAN, Tsinghua University, School of Materials Science and Engineerig, Beijing, SPINTRONICS TEAM

— We investigate tunneling anisotropic magnetoresistance (TAMR) in antiferromagnets (AFM)-based junctions, where Co/Pt magnetization drives partial rotation of AFM moments with the formation of exchange-spring [1]. The existence of exchange-spring is further confirmed by element specified x-ray magnetic dichroism [2]. Because of superior thermal tolerance of perpendicular exchange coupling and the stability of moments of ~ 6 nm-thick IrMn in [Pt/Co]/IrMn/AlO$_x$/Pt junctions, TAMR gets significantly enhanced up to room-temperature [1]. The TAMR behavior in [Pt/Co]/IrMn/AlO$_x$/metal junctions is insensitive to the top metal electrodes [3]. The situation turns out to be different when the top electrode is replaced by AFM. TAMR is observed in IrMn/AlOx/IrMn junctions, where the resistance states are governed by the relative arrangement of the AFM moments adjacent to AlO$_x$ [4]. Our findings would advance the process towards practical AFM spintronics.

[1] Y. Y. Wang, et al. Phys. Rev. Lett., 109, 137201 (2012).
[2] Y. Y. Wang, et al. New J. Phys., in press.
[3] Y. Y. Wang, et al. Appl. Phys. Lett., 103, 202403 (2013).
[4] Y. Y. Wang, et al. Adv. Funct. Mater. doi: 10.1002/adfm.201401659.

[1] This work was supported by NSFC (Grant Nos. 51322101, and 51202125) and 863 project of China (Grant no. 2014AA032904).

Cheng Song
Tsinghua University, School of Materials Science and Engineerig, Beijing

Date submitted: 11 Nov 2014 Electronic form version 1.4