Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Spin Hall effect tunneling spectroscopy LUQIAO LIU, CHING-TZU CHEN, JONATHAN SUN, GUOHAN HU, DANIEL WORLEDGE, IBM TJ Watson Research Center — The spin Hall effect (SHE) has attracted a lot research interest recently. Up to now, almost all of the experimental efforts related to the SHE have been focused on utilizing or characterizing electrons at the Fermi surface (FS). In this talk, we will report a technique with which one can determine the magnitude of the SHE under finite bias voltage. In our study, the spin Hall effect (SHE) was measured by injecting a spin polarized current from a ferromagnet electrode into SHE materials through an insulating tunnel barrier. By applying a combination of DC and AC current across the tunnel barrier, we were able to probe the SHE under finite biases via measuring the generated transverse voltage. Two different materials, Ta and Pt were examined with this technique. Under zero bias, the obtained SH angles agree well with previous results determined through the SHE induced switching and oscillation experiments, while below and above the FS, the SHE in those two materials shows different voltage dependences. The experimentally determined voltage dependence of the SHE can be used to check the validity of various types of band structure calculations and it also provides a guideline on further increasing the magnitude the SHE via electronic structure engineering.

Luqiao Liu
IBM TJ Watson Research Center

Date submitted: 14 Nov 2013 Electronic form version 1.4