

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spin Hall effect in p-Si¹ SANDEEP KUMAR, PAUL LOU, Univ of California - Riverside — The spin-Hall effect is considered to be an efficient method for generation of pure spin current for spintronics applications instead of spin injection from a ferromagnetic source. Si is the apex semiconductor for electronics devices and considered to be the ideal material for spintronics as well due to relatively long spin diffusion length. The p-Si is proposed to exhibit the spin Hall effect and, currently, there is no experimental evidence of spin-Hall effect in p-Si. In this study, we report interactions and coupling of spin, charge and thermal transport behavior in p-Si. The spin Hall angle in p-Si is 10^{-4} , which leads to insignificant spin-Hall magnetoresistance. Instead, we rely on magneto thermal transport behavior to discover spin Hall effect in p-Si. The spin-phonon interactions are proposed to be the underlying mechanism for the observed behavior, which is supported by Raman spectroscopy measurements. The observed magneto-thermal transport behavior is called as spin Hall magneto thermal resistance or SMTR. The spin-phonon interactions, presented in this work, may allow thermal manipulation of spin current, which essential for energy efficient spintronics, spin caloritronics and energy conversion applications.

¹S. Kumar gratefully acknowledges the support from the National Science Foundation, USA (Grant no CMMI 1550986)

Sandeep Kumar
Univ of California - Riverside

Date submitted: 08 Nov 2016

Electronic form version 1.4