

MAR14-2013-020043

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Spin-pumping-induced spin transport in Si and graphene at room temperature

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Spin transport in Si is one of the quite significant research targets in semiconductor spintronics, since Si is expected to possess long spin coherence because of its lattice inversion symmetry and spin transistors using Si can be a potential beyond CMOS device. By now, much effort has been paid to realize room temperature spin transport in n-type and p-type Si, however there was no report on it in p-type Si. Here, our recent success on spin transport in p-type Si at room temperature [1] by using spin pumping is presented. Spin pumping is well known as a potential method for spin injection into materials with a large spin-orbit coupling, resulting in successful conversion from a pure spin current to a charge current [2]. Simultaneously, spin pumping is also potential for generating spin-wave spin current in YIG [3]. Now, we used this attractive method for generating a conventional pure spin current and for transporting spin angular momentum in solids [1,4,5]. A number of control experiments for p-Si spin devices corroborated our claim, and the spin coherence at room temperature was estimated to be ca. 120 ps in the simplest model. This method can be used in graphene [4] and Al [5], and they will be also introduced in the presentation.

- [1] E. Shikoh, M. Shiraishi et al., Phys. Rev. Lett. 110, 127201 (2013).
- [2] E. Saitoh et al., Appl. Phys. Lett. 88, 182509 (2006).
- [3] Y. Kajiwara, E. Saitoh et al., Nature 464, 262 (2010).
- [4] Z. Tang, M. Shiraishi et al., Phys. Rev. B87, 140401(R) (2013).
- [5] Y. Kitamura, M. Shiraishi et al., Sci. Reports 3, 1739 (2013).