Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin injection and transport in graphene via spin Hall effect in Au[1] BOWEN YANG, JING SHI, Department of Physics and Astronomy, Univ of California - Riverside — Graphene is a promising material for spintronics due to its negligible intrinsic spin-orbit coupling (SOC, 1-50 μeV in perfect flat graphene) derived from the light weight of carbon atoms. Experimentally, graphene shows a spin diffusion length greater than 1 μm at room temperature even though it is coupled to a substrate, as demonstrated by nonlocal spin valves. In this work, we investigate the spin injection and transport in graphene using a nonlocal Hall bar geometry with Au strips along the Hall bar arms. When a charge current flows along one Au Hall bar arm, it induces a pure spin current in Au due to the spin-Hall effect (SHE). The spin current is injected into graphene and propagates along the etched graphene channel. As it arrives at the other Au strip, the spin current is detected by the inverse spin-Hall effect (ISHE) in Au. In a 2 μm long, 0.2 μm wide Hall bar, the nonlocal resistance we obtained is 10 $\mu\Omega$. Considering the small spin-Hall angle (0.01-0.02) of evaporated Au, the magnitude of the nonlocal resistance suggests efficient spin injection from metal directly into graphene. The simplicity and high injection efficiency of this method is suitable for further exploration of spin transport mechanism in graphene.

[1]This work was supported by a DOE/BES award.

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Date submitted: 14 Nov 2014 Electronic form version 1.4