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Spin transport and Relaxation in Graphene[1] WEI HAN, ROLAND KAWAKAMI, University of California, Riverside — Graphene is an attractive material for spintronics due to the low intrinsic spin-orbit and hyperfine coupling, which should lead to excellent spin transport properties. We investigated the spin injection, transport and relaxation in single layer graphene (SLG) using non-local magnetoresistance (MR) measurements. Spin injection is performed using either transparent contacts (Co/SLG) or tunneling contacts (Co/MgO/SLG). With tunneling contacts, the non-local MR is increased by a factor of ∼1000 and the spin injection/detection efficiency is greatly enhanced from ∼1% for transparent contacts to 26-30%. Gate tunable spin transport is performed using the SLG properties of gate tunable conductivity and incorporating different types of contacts (transparent and tunneling contacts). Spin relaxation is investigated on SLG spin valves using Hanle measurements. Comparing the measured spin lifetimes for transparent contacts and tunneling contacts, we observed enhanced spin lifetimes for tunneling contacts which indicates that spin relaxation induced by the contacts is important. These developments are important advances for graphene to be used for spin computing or spin logic applications.

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