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Alternative generation of spin current in graphene¹ JUNG-WOO YOO, MI-JIN JIN, JUNGMIN PARK, VIJAYAKUMAR MODEPALLI, JUN-HYEON JO, Ulsan Nation Institute of Science and Technology, Republic of Korea — The manipulation of spin current which can be achieved in various device configurations has been under intense research in recent years. The spin current is typically obtained by injecting electrons from the ferromagnetic electrodes. In this study, we employed alternative methods for the generation of spin current in graphene. The first method we studied is using spin Hall effect. In the spin Hall effect, the charge current generates spin current due to a relativistic spin-orbit coupling. Generally the spin-orbit coupling in graphene is extremely weak to produce substantial spin current. We employed physical doping of heavy atoms on top of the graphene layer for the spin Hall induced spin current in graphene. The second alternative method we investigated is seebeck spin tunneling. The ferromagnetic electrode together with thin tunnel barrier (1-3nm of Al₂O₃ layer) was employed to introduce thermally induced spin imbalance in graphene. The gate dependence of generated spin current reflects unique electronic structure of graphene.

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