Studying spin transport in epitaxial graphene on silicon carbide

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Graphene is amongst the most promising material for future spintronic applications, such as spin-based logic circuits, due to its excellent spin transport up to room temperature [1,2]. While the fundamental problems of spin injection, detection, manipulation and charge interconversion have been tackled, recent advances mostly rely on exfoliated graphene. A material source for wafer-sized graphene with reliable spin transport is therefore needed as a steppingstone in the 2D material spintronics field. Epitaxially-grown graphene on silicon carbide could be one candidate to overcome this obstacle. Efficient spin transport has been reported in this material [3], with indications that the presence of localized states in the buffer layer strongly influences the spin transport [4,5].
Here, we study the spin transport parameters of graphene on silicon carbide for the different spin polarization directions in lateral spin valves by non-local electrical measurements under applying oblique magnetic fields, a method already established in exfoliated graphene devices [6]. The resulting Hanle precession diffusion data allows us to extract the spin diffusion length for in-plane and out-of-plane polarized spin currents, providing additional information on the spin relaxation mechanisms.

References

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