Abstract Submitted
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Enhanced spin-orbit coupling in single layer CVD WSe2/graphene heterostructures[1] MARK LOHMANN, BOWEN YANG, Department of Physics and Astronomy, UC, Riverside, DAVID BARROSO, LUDWIG BARTELS, Department of Chemistry, UC, Riverside, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, 305-0044 JAPAN, JING SHI, Department of Physics and Astronomy, UC, Riverside — Spin-orbit coupling (SOC) in graphene can be strongly enhanced via proximity effect when graphene is in contact with transition metal dichalcogenides (TMDs) [1]. However, bulk TMDs are hard to be exfoliated to single or few layers while maintaining a practically large size. An alternative approach by using chemical vapor deposition (CVD) grown WSe_2 allows us to overcome this obstacle. We have succeeded in picking up a single layer CVD WSe_2 flake with hBN and transferring it onto an exfoliated graphene flake. Due to the lower carrier density per unit area of the CVD WSe_2, we are able to tune the Fermi level in graphene over a wide range, and observe a clear weak antilocalization at various carrier densities, indicating a strong enhancement of the SOC strength in graphene due to the proximity interaction of the WSe_2. Meanwhile, the universal conductance fluctuation is also suppressed owing to the large size of the WSe_2. We extract the spin relaxation time which is roughly one fourth that of previously studied WS_2/graphene heterostructures [1] and thus a 100% increase in the SOC strength. [1] B. Y. et al., 2D Mater. 3, 031012 (2016).

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