Multiprobe Mesoscopic Transport Measurements on Two-Dimensional Materials

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To perform conventional mesoscopic electronic transport measurements on two-dimensional (2D) materials, deposition of a set of electrodes is required. We demonstrate that with the use of a colinear multiprobe cantilever, these kinds of measurement can be executed without the deposition of electrodes on the surface. We show back gated electronic transport measurements on mono- and bilayer graphene [1] and molybdenum disulfide. Furthermore, the damage resulting from the probe landings is assessed.

References

[1] K. Vonk, J.D. Verbakel, R. Huijink, H.J.W. Zandvliet, Rev. Sci. Instrum. 94, 084707 (2023)

Figures

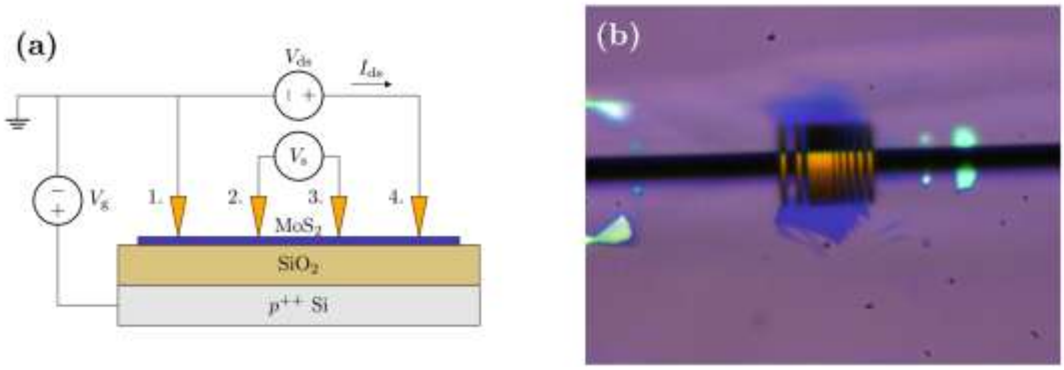

Figure 1: (a) Schematic of the measurement setup used to perform multiprobe electronic transport measurements on 2D materials. (b) Microscope image of the probe landed on a bilayer MoS_2 flake.

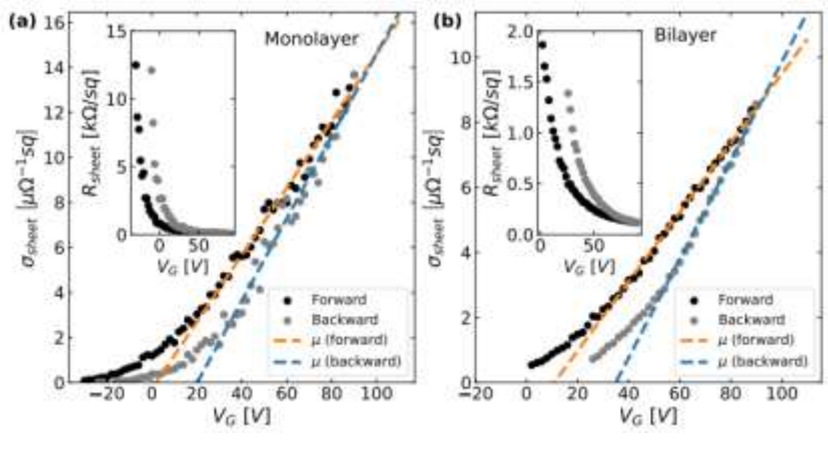

Figure 2: Sheet conductance and sheet resistance (inset) vs back gate voltage for monolayer MoS2 (a) and bilayer MoS_2 (b). The orange and blue lines are fits of the field effect mobility. The monolayer has mobilities 12.3 cm²/Vs (forward scan) and 15.1 cm²/Vs. The bilayer mobilities are 8.8 cm²/Vs (forward scan) and 12.5 cm²/Vs.