Improved Fabrication of CVD Graphene Electrodes

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Van der Waals heterostructures have attracted rapidly growing scientific interest for a new generation of electronic and optoelectronic devices. Using dangling-bond-free 2D layers, unprecedent flexibility in the device fabrication is reached due to absence of lattice matching constraints. Additional benefits such as high flexibility and transparency make these materials promising candidates for ultrathin, flexible and transparent devices that can be used to facilitate wearable electronics. Of particular interest are semiconducting 2D layers such as MoS2, WSe2 and WS2 [1]. However, creating electrical contacts to these materials is complicated due to invasive nature of metal deposition. In fact, hybridization between the semiconductor monolayer and the metal results in formation of Schottky barriers that dominate device performance [2, 3]. In this work, we study fabrication of graphene electrodes as an alternative route to provide reliable electrical contact to semiconductor monolayers [4]. Particular attention is given to cleanliness of the graphene surface and continuity of the film. Improved fabrication technique is suggested to obtain clean and repeatable interfaces (Fig. 1).

References

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[3] Y. Fan et al., Adv. Opt. Mater. 4 (2016) 1573.
[4] H. Tan et al., ACS Nano. 10 (2016) 7866.

Figures

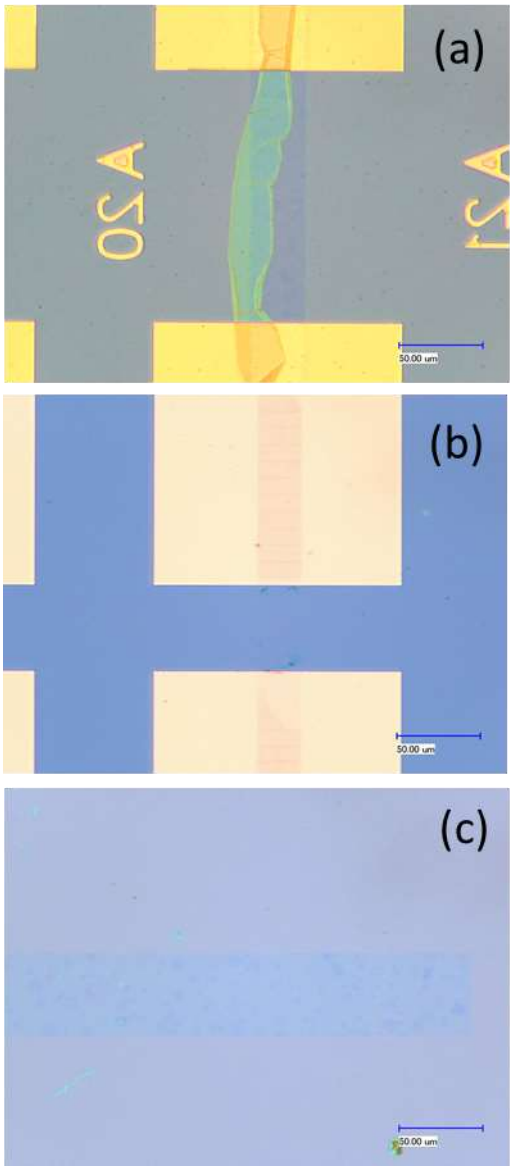

Figure 1: (a, b) Fabrication challenges of graphene electrodes including polymer skin layer and graphene removal. (c) Improved graphene patterning.