A novel way: fabricated TMDC transistors based on graphene by electrodeposition

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Abstract

Short channel effects make the Transition Metal Dichalcogenides (TMDC), becoming a new focus. One of the challenges for TMDC transistors is decreasing the contract resistance which is caused by the van der Waals interactions between the layers. Electrodeposition is an industrially compatible deposition technique that offers unique advantages in scaling 2D heterostructures. In previous work, we electrodeposited of few layers MoS2, WS2, and WSe2 on graphene substrates. We have also demonstrated the use of metal electrodes (TiN) to deposit TMDCs materials or heterojunctions. In future work, we will use graphene as electrodes to deposit TMDCs and their heterojunctions, over graphene to make TMDCs transistors.

References

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Figures

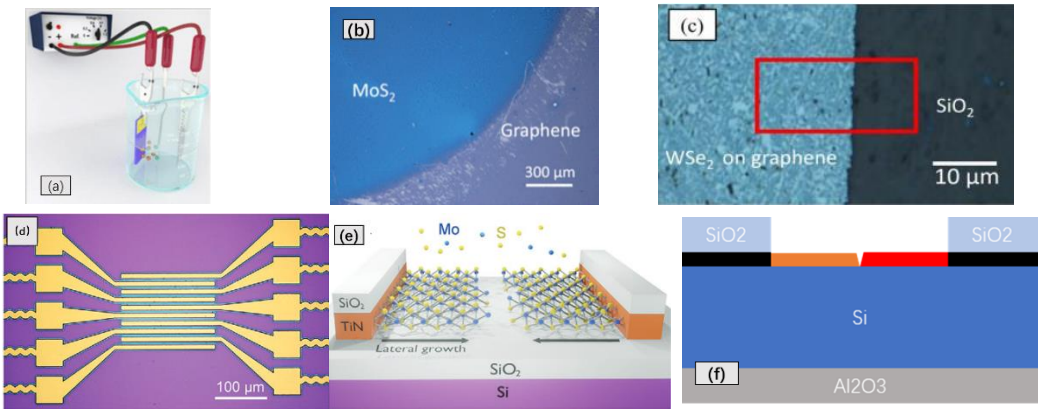

Figure 1: (a) A schematic illustration of a three-electrode electrodeposition setup with a substrate. (b) Optical microscope image of electrodeposited MoS2 on graphene. (c) Optical microscope image of electrodeposited WSe2 on patterned graphene. (d) A microscope image of the fabricated electrode structure showing ten adjacent electrodes, where the pattern used for electrodepositing the TMDC materials. (e) An illustration of the concept of this work showing TiN electrodes that are top covered with a SiO2 insulator with a TMDC MoS 2 film growing laterally on the SiO 2/Si substrate. (f) Schematic diagram of a transistor structure using graphene, in which the black part is graphene and the orange and red blocks are heterojunctions generated laterally by graphene.