SUPPORTING INFORMATION

Lithography-free plasma-induced patterned growth of MoS_2 and its heterojunction with graphene

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Contents:

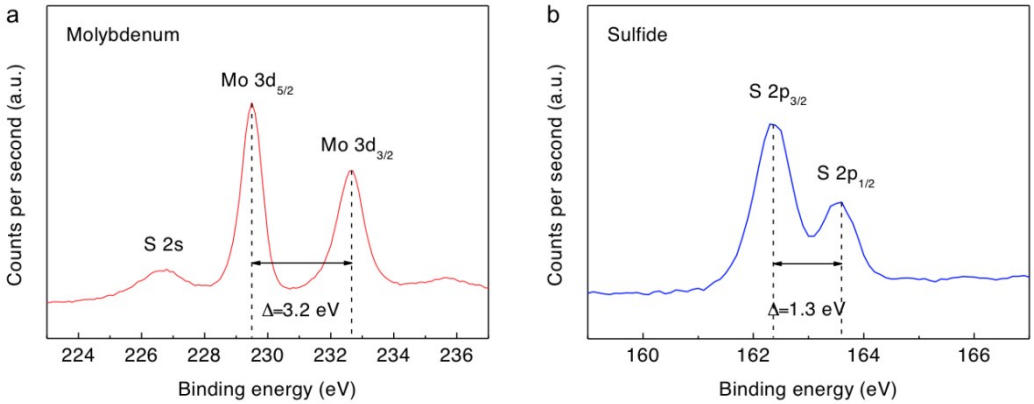

Fig. S1 (a, b) X-ray photoemission spectroscopy (XPS) results of the binding energy for Molybdenum (a) and Sulfide (b) from patterned monolayer MoS_2.

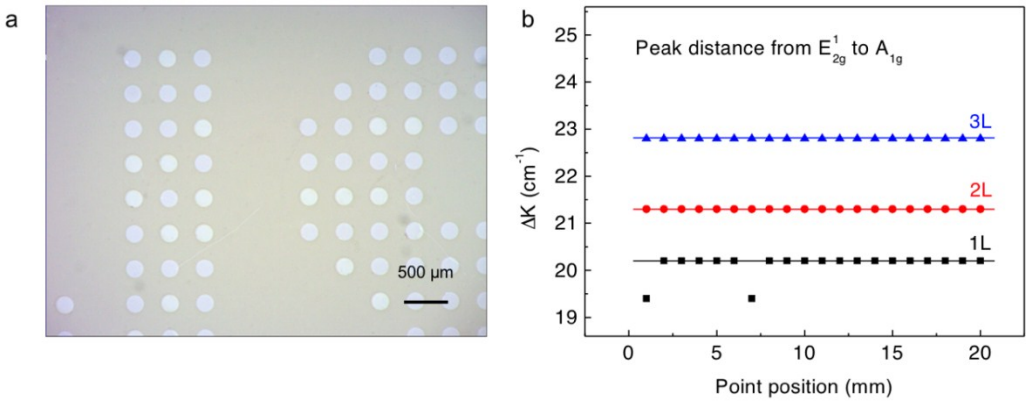

Fig. S2 (a) Optical microscope image of a part of "YONSEI" mark consists of patterned MoS_2 layers in circle shape after transferred onto sapphire substrate. (b) Peak distances of $E^1{}_{2g}$ and A_{1g} peaks for 20 measurement points from the patterned 1L-3L MoS_2 on SiO_2 substrate in size of 2×2 cm.

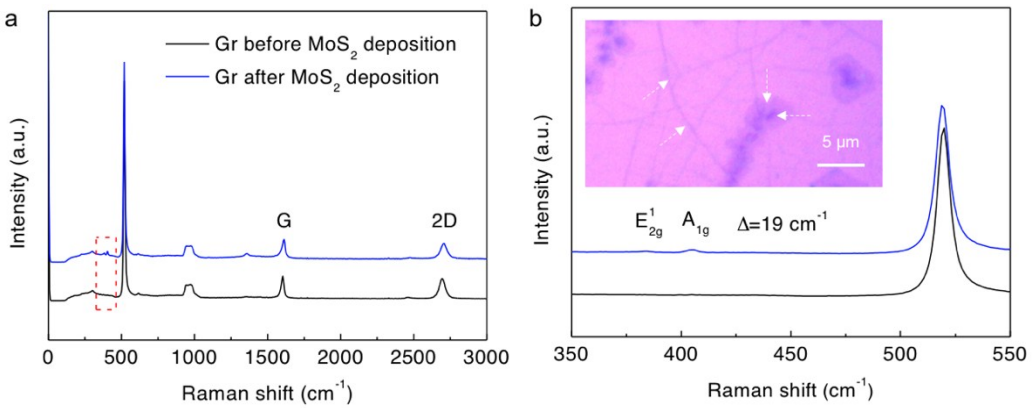

Fig. S3 (a, b) Raman spectra of bilayer CVD graphene before and after MoS_2 deposition in large (a) and small (b) ranges. Inset shows the optical microscope image of bilayer graphene after MoS_2 growth, and MoS_2 tends to grow along the wrinkles or on the 2L/3L graphene seeds.

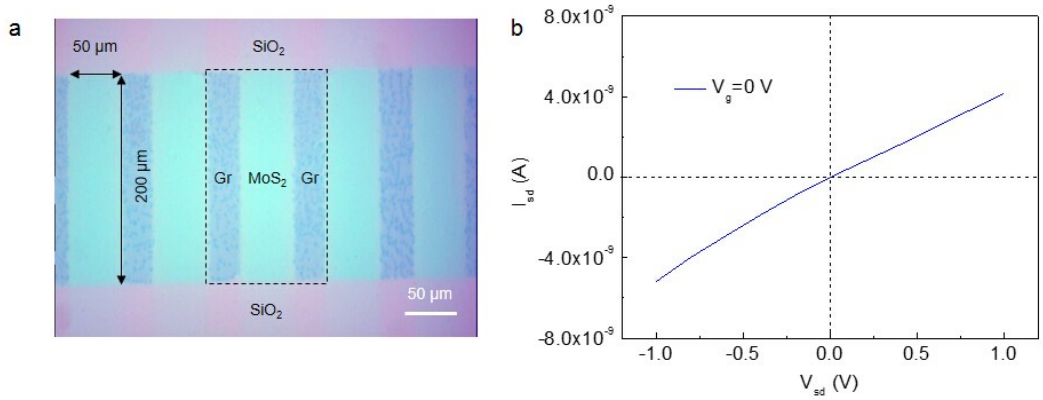

Fig. S4 (a) Optical microscope image of a transistor unit composed of MoS_2 channel and graphene electrodes, as marked in the black box. The length and width of the MoS_2 channel are 50 μm and 200 μm, respectively. The top and bottom parts have been etched by using CHF_3/O_2 plasma (35/10 sccm, 100 W, 6 s) with help of a shadow mask. (b) I-V electrical property of the transistor. The source-drain bias (V_{sd}) was swept from -1 V to 1V, and the back-gate voltage (V_g) was 0 V.