Wafer Scale MoS_2 Thin Layers Prepared by MoO_3 Sulfurization

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Figure S1. Addition AFM image showing that the cross-sectional height is ~ 1.8nm (trilayer MoS_2)

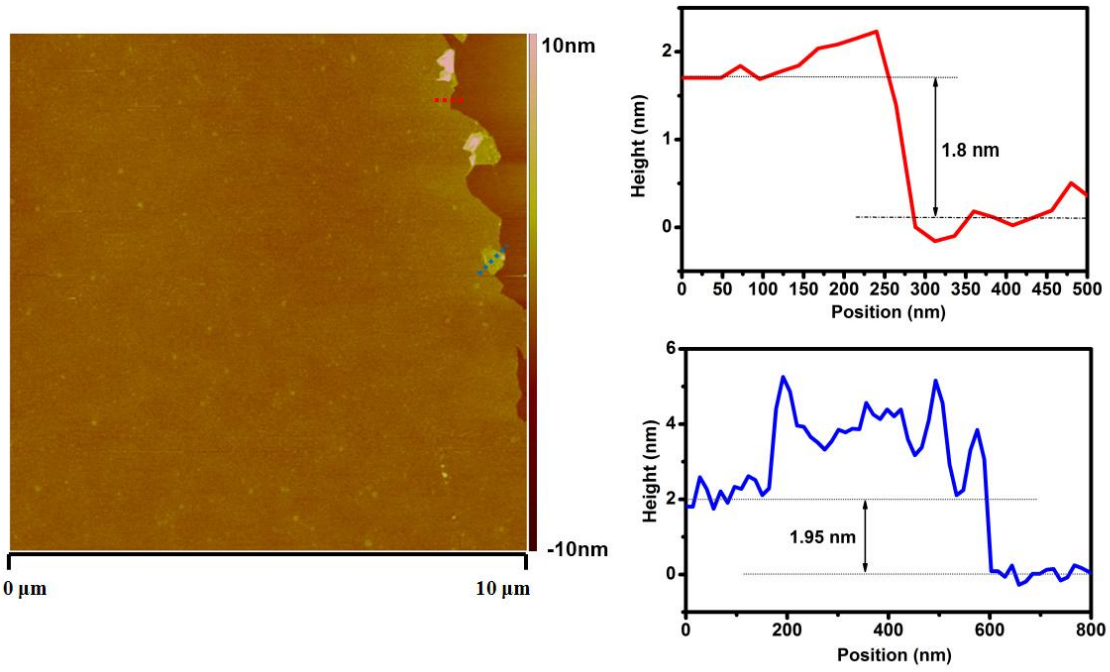

Figure S2. The X-ray photoemission spectroscopy (XPS) survey scans for the Mo and S binding energies of the MoO_3 layer before and after sulfurization.

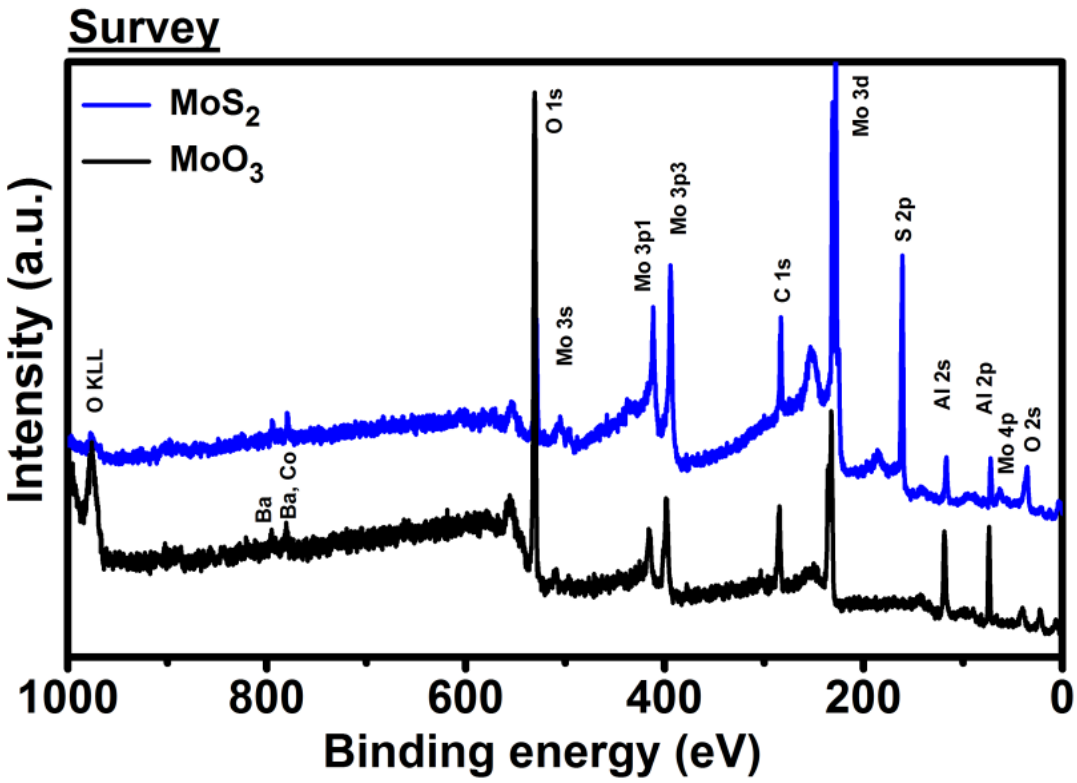

Figure S3. (a) Transmittance and (b) Absorption spectrum for the MoS_2 layer.

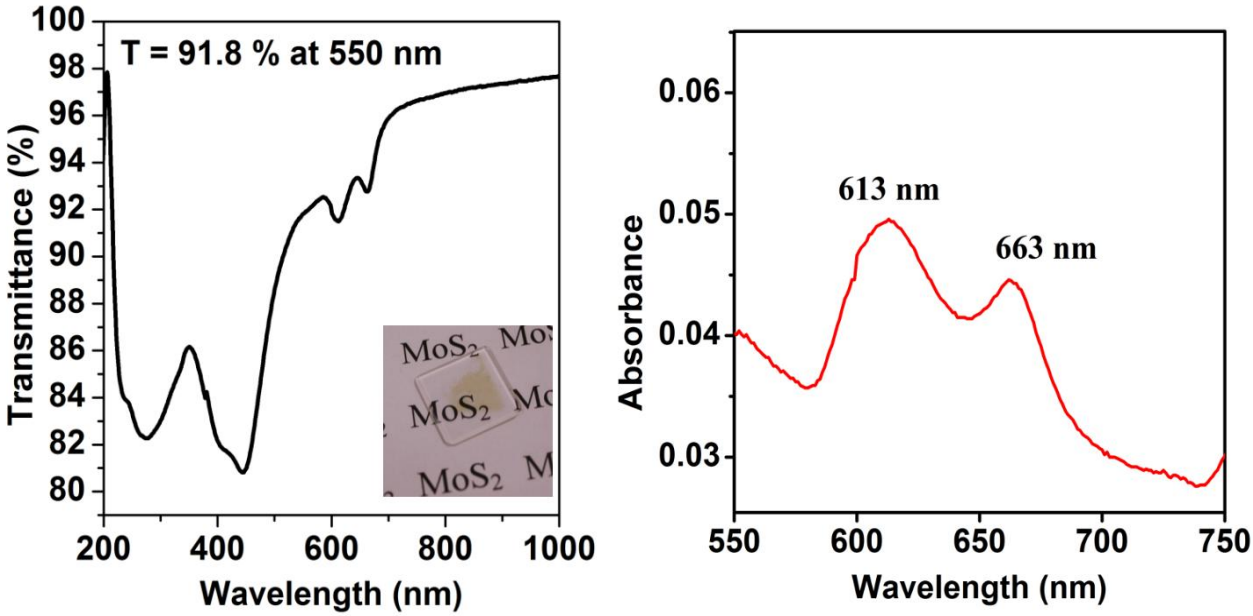

Figure S4. (a) PL spectrum of the MoS2 trilayer. (b) The PL intensity percentage variations vs. the area number, where the PL intensity is calculated by integrating the peak area from 570 to 700 nm and the PL intensity percentage variation is relative to the average PL intensity values for all points in the mapping.

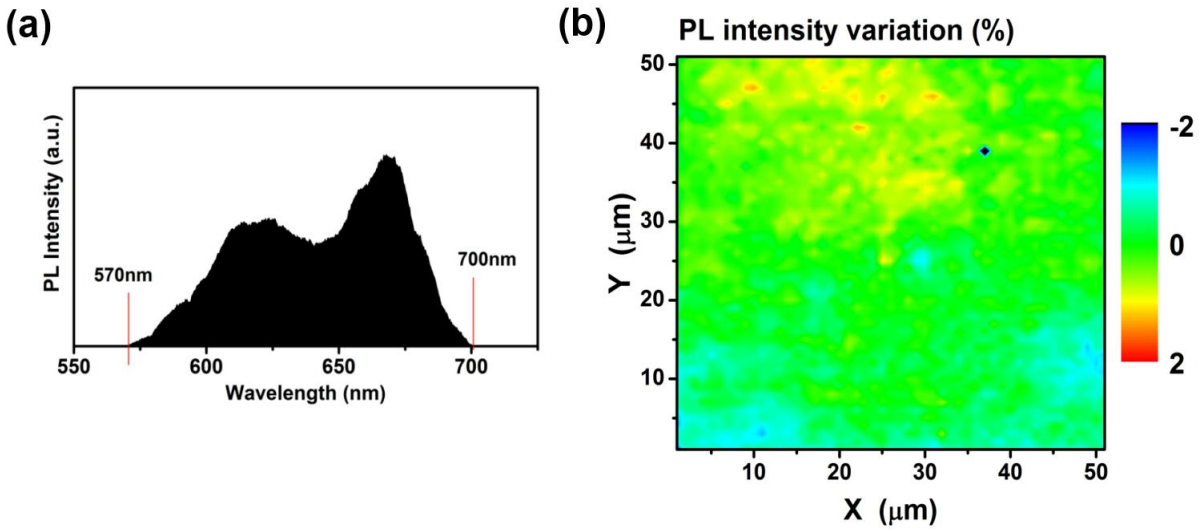

Figure S5. (a) Single Raman spectra for the MoS_2 trilayer. Raman mappings for (b) A_{1g} peak energy, (c) A_{1g} peak width, (d) Δ value, (e) E_{2g}^1 peak energy and (f) E_{2g}^1 peak width of the MoS_2 trilayer.

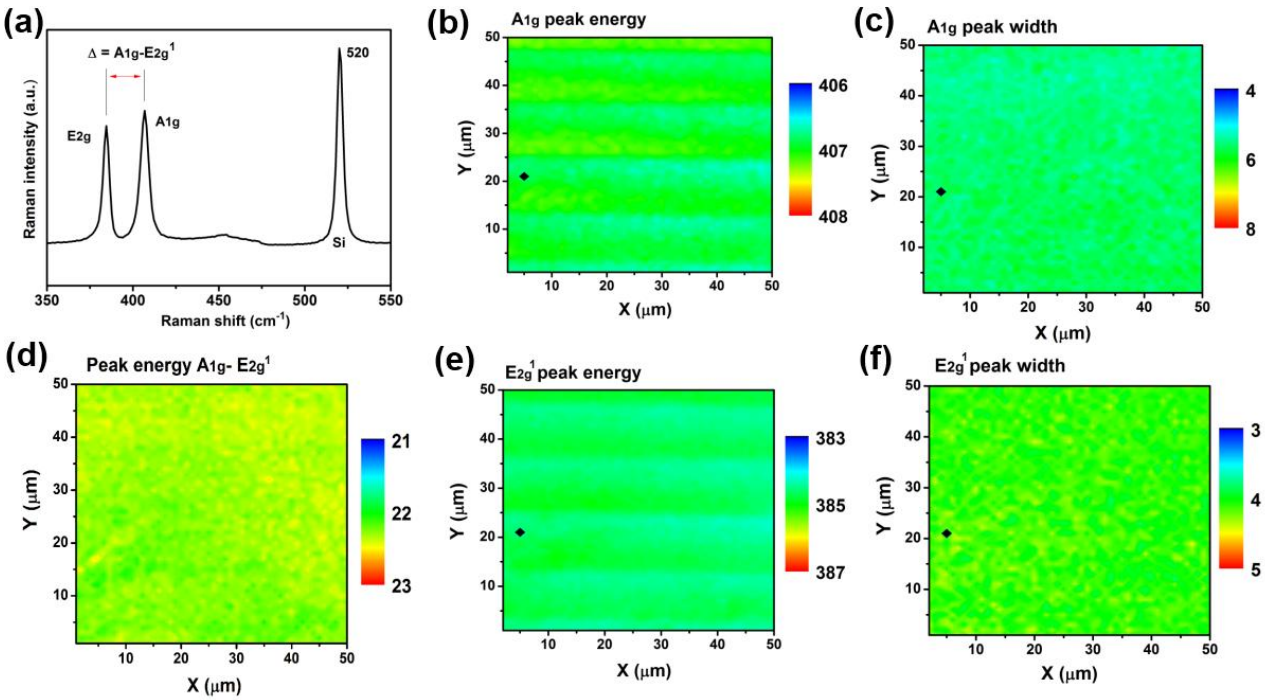

Figure S6. AFM images for the MoS_2 flakes obtained after sulfurization of the MoO_3 layers with various thicknesses.

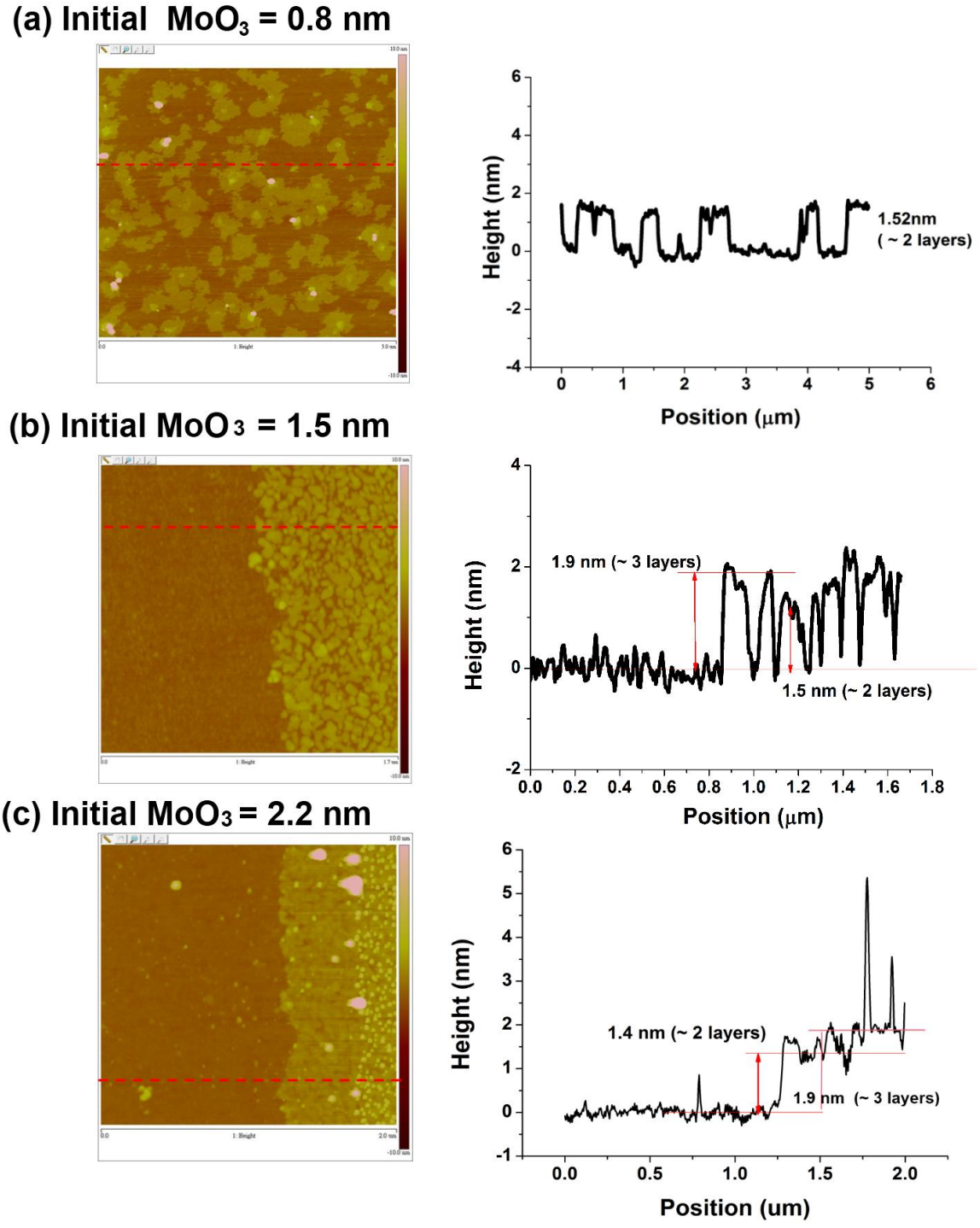

Figure S7. (a) The Raman D value, and (b) PL B1 peak position for the MoS_2 films or flakes as a function of initial MoO_3 thicknesses.