Supplementary information:

Raman Spectroscopy of 2D MoS_2 on Ti_3C_2 MXene: the Substrate Effect

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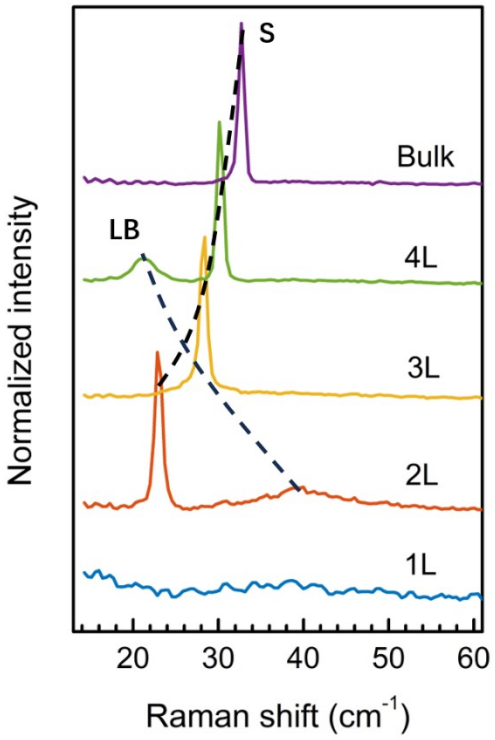

Fig. S1. Low-frequency interlayer breathing (LB) and shear (S) modes in MoS_2. Due to the nature of interlayer vibration, S and LB modes are absent in 1L. In 3L, S and LB modes are near degenerate. The LB mode is Raman-inactive in bulk MoS_2.

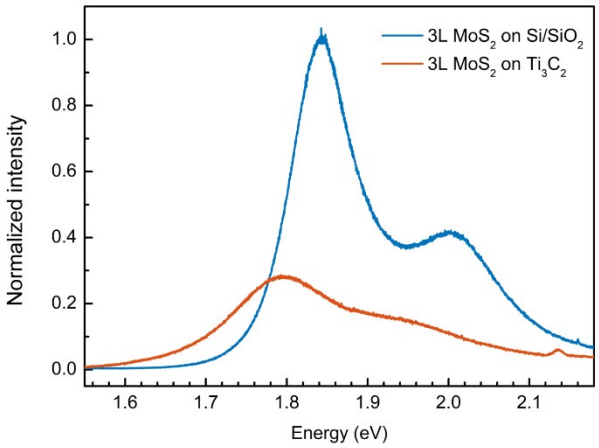

Fig. S2. Photoluminescence (PL) spectra of 3L MoS_2 on Ti_3C_2 MXene in comparison with 3L MoS_2 on Si/SiO_2.

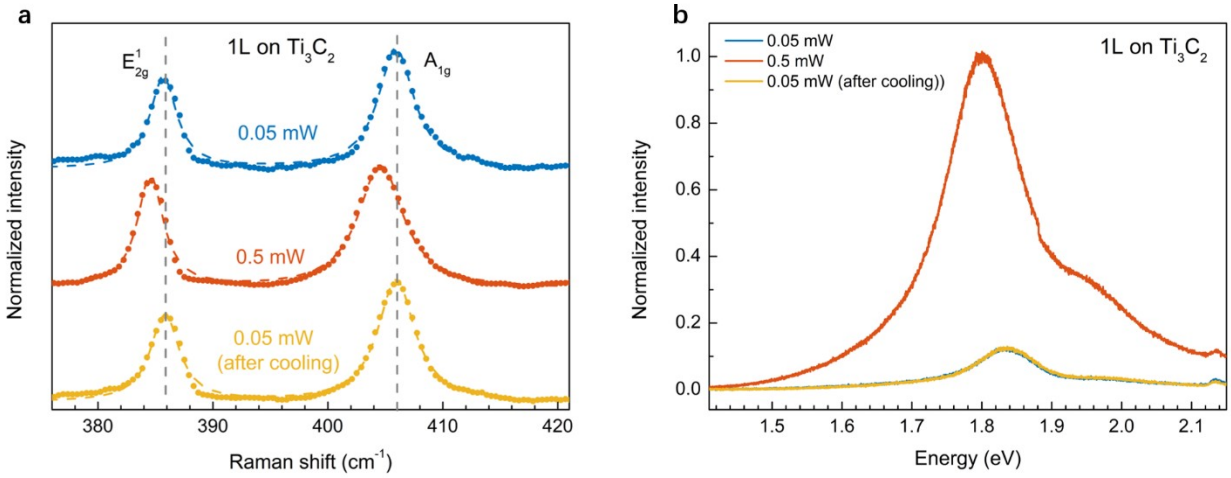

Fig. S3. Raman (a) and Photoluminescence (PL) (b) spectra of 1L MoS_2 on Ti_3C_2 MXene under excitation powers of 0.05 mW and 0.5 mW. The data from 0.05 mW (after cooling) were taken after measuring at 0.5 mW, with the laser blocked for 1 h to allow the sample to cool down.

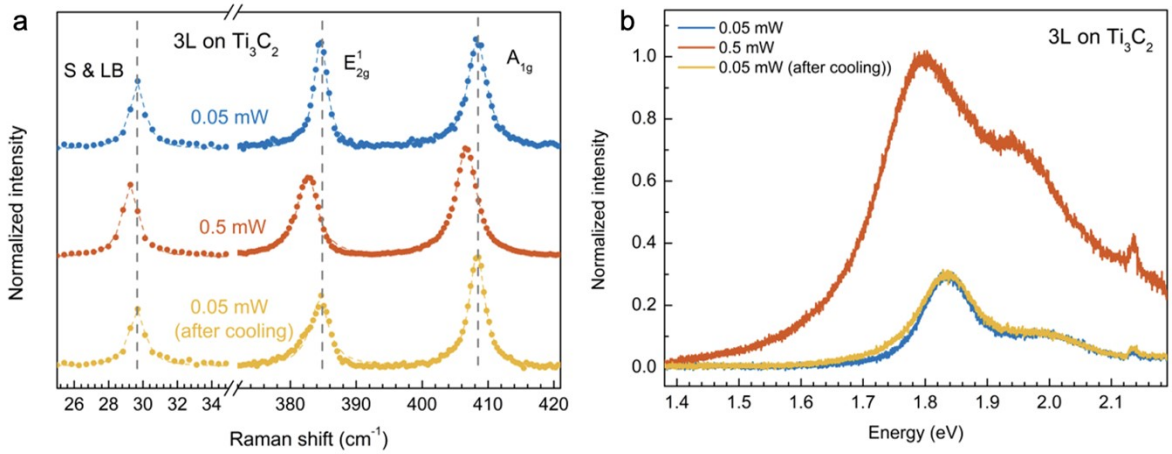

Fig. S4. Raman (a) and Photoluminescence (PL) (b) spectra of 3L MoS_2 on Ti_3C_2 MXene under excitation powers of 0.05 mW and 0.5 mW. The data from 0.05 mW (after cooling) were taken after measuring at 0.5 mW, with the laser blocked for 1 h to allow the sample to cool down.

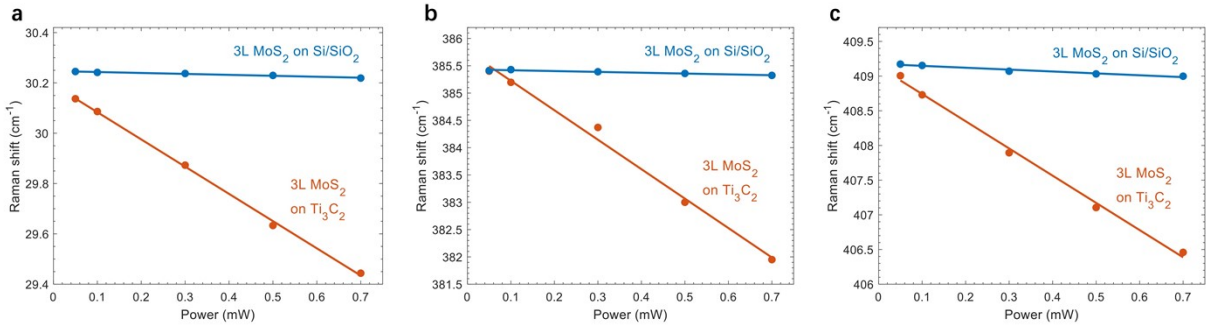

Fig. S5. Raman peak positions as a function of excitation power. (a-c) Peak positions of the S (a), E^1_{2g} (b) and A_{1g} (c) modes. Dots are experimental data and lines are from linear fits.

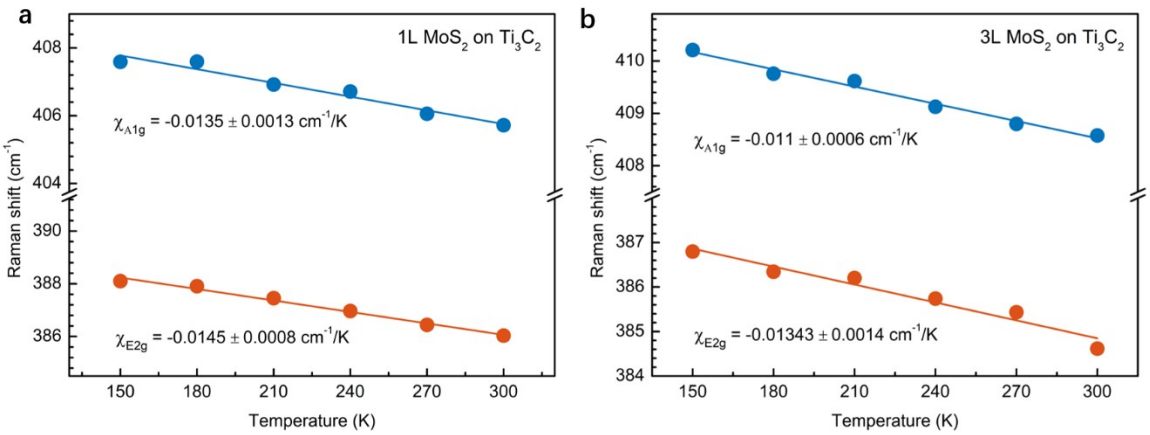

Fig. S6. Temperature-dependent Raman peak positions of 1L and 3L MoS_2 on Ti_3C_2 MXene.

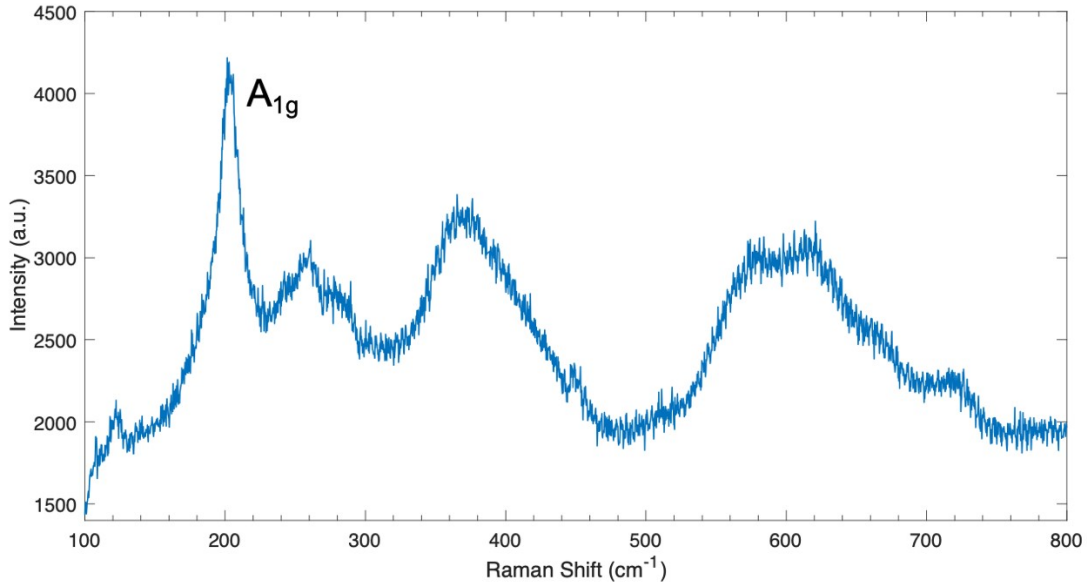

Fig. S7. Raman spectra of Ti_3C_2 MXene paper. Excitation wavelength: 633 nm.

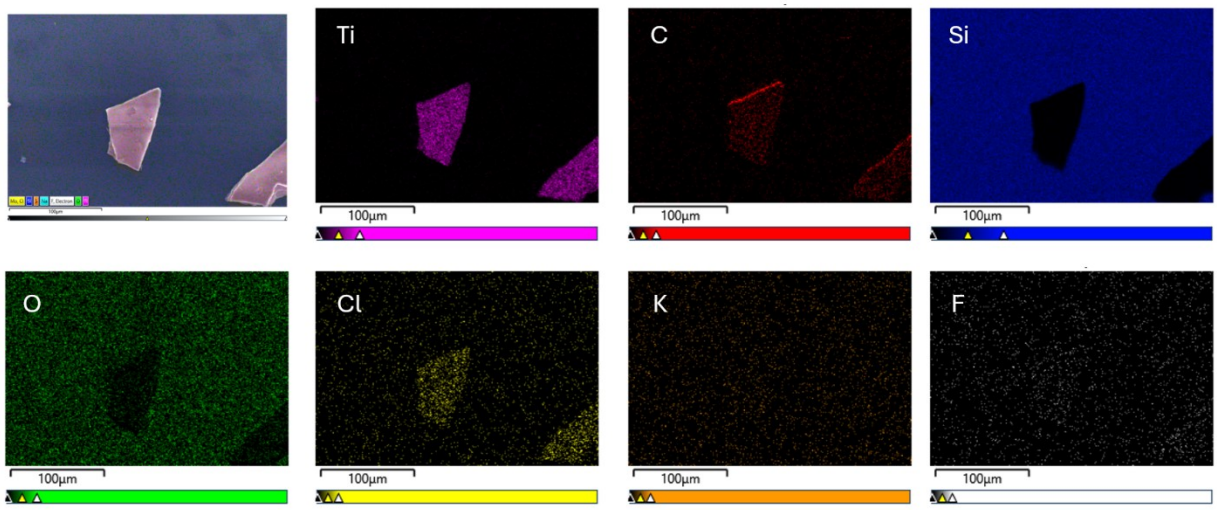

Fig. S8. Energy Dispersive Spectroscopy (EDS) mapping image of the exfoliated Ti_3C_2 multilayers on the Si/SiO_2 substrate.