Supporting Information

Chemical Vapor Deposition of Clean and Pure MoS_2 Crystals by Inhibition of MoO_{3-x} Intermediates

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Table S1. Summary of Raman characterization of MoS_2 and MoO_{3-x}/MoS_2 composites.

Sample No.	Heating rate of S (℃/min)	Raman peaks for MoS_2 (cm^{-1})	$A_{1g} - E^1_{2g}$ (Δ k) (cm^{-1})	Raman peaks for MoO_2 and/or $MoOS_2$ (cm^{-1})
1	1	E^1_{2g}: 381 A_{1g}: 408	27	128, 204, 230, 344, 361, 494, 566, 741
2	5	E^1_{2g}: 382 A_{1g}: 405	23	124, 204, 227, 494, 566, 742
3	8	E^1_{2g}: 381 A_{1g}: 402	21	

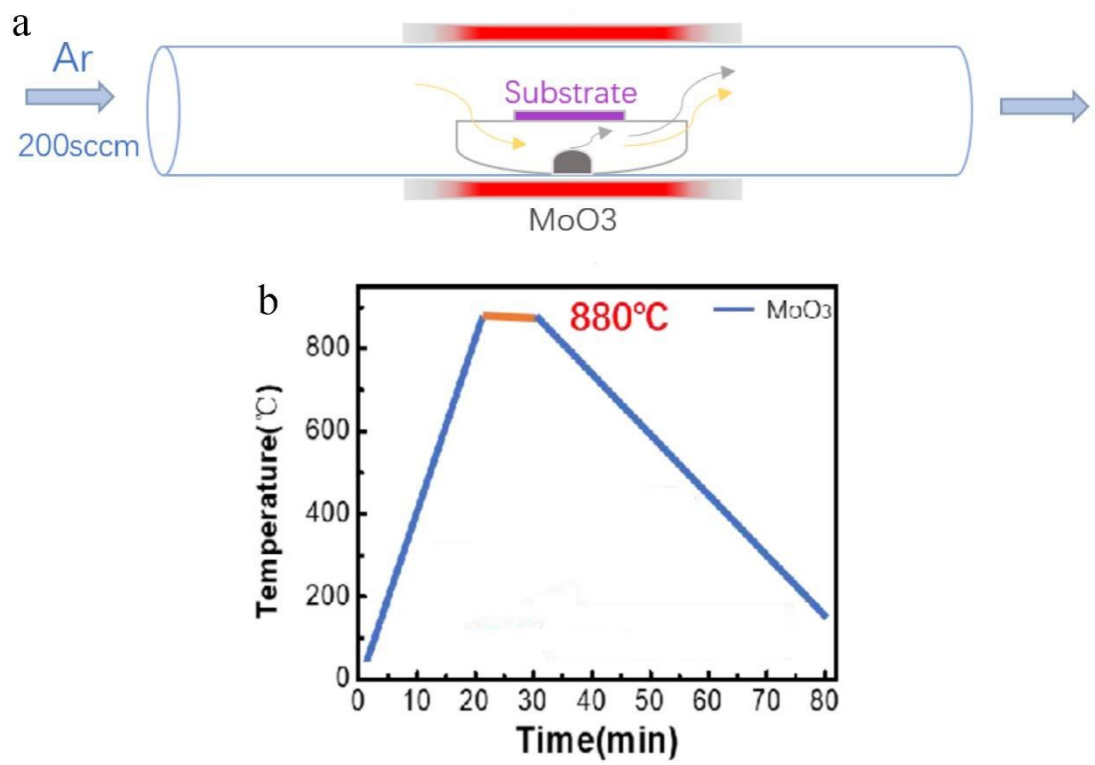

Figure S1. (a) Schematic diagram of the CVD setup for the S-free growth which has only high temperature zone. (b) Temperature ramping processes of the MoO_3 precursor as a function of time.

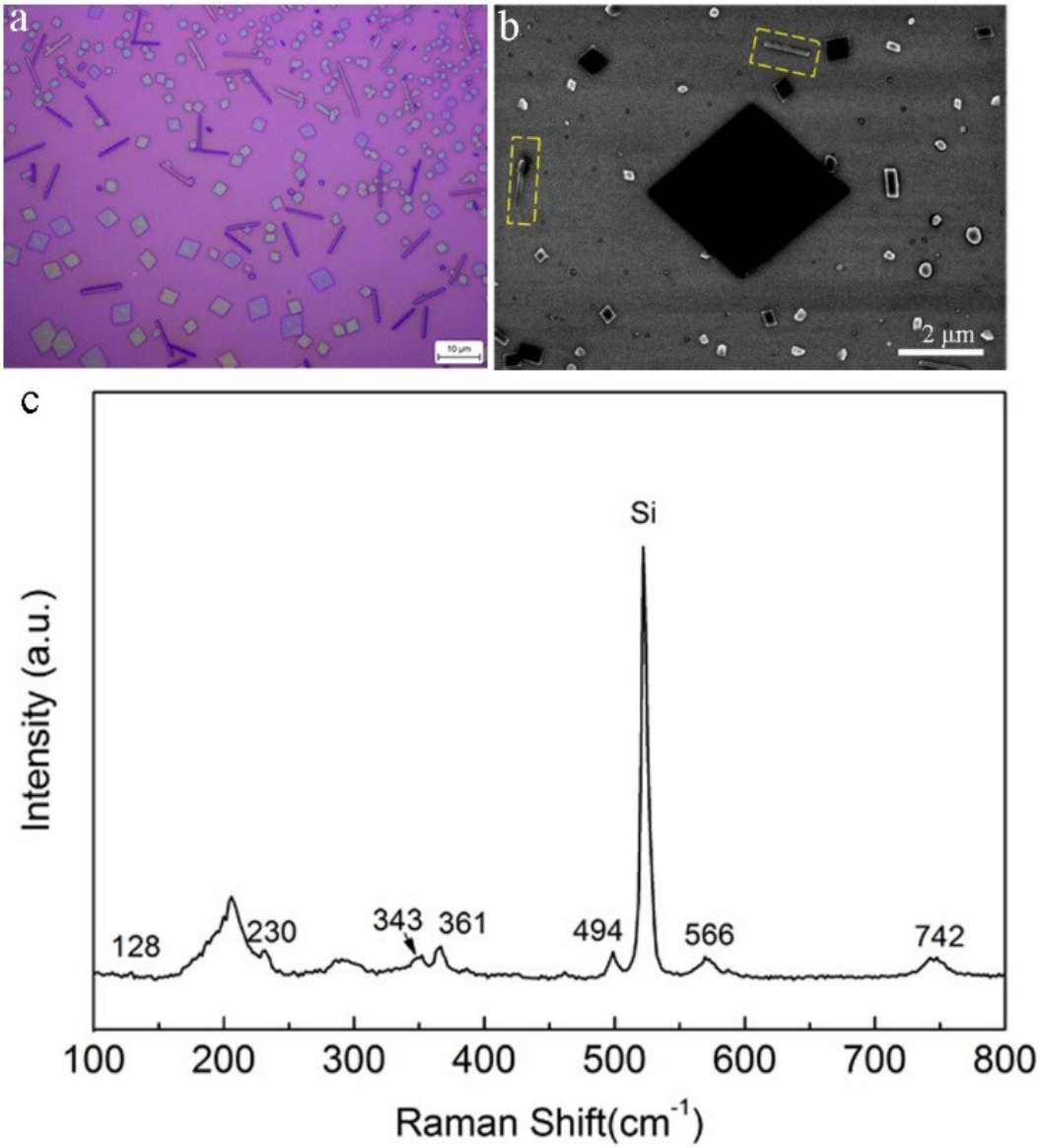

Figure S2. (a) Optical image of quadrilateral and striped shapes of products grown without S precursor. (b) Enlarged SEM image of quadrilateral and striped shapes of products grown without S precursor. (d) Raman spectra of a typical quadrilateral product grown without S precursor, showing obvious Raman characteristics of MoO_2.

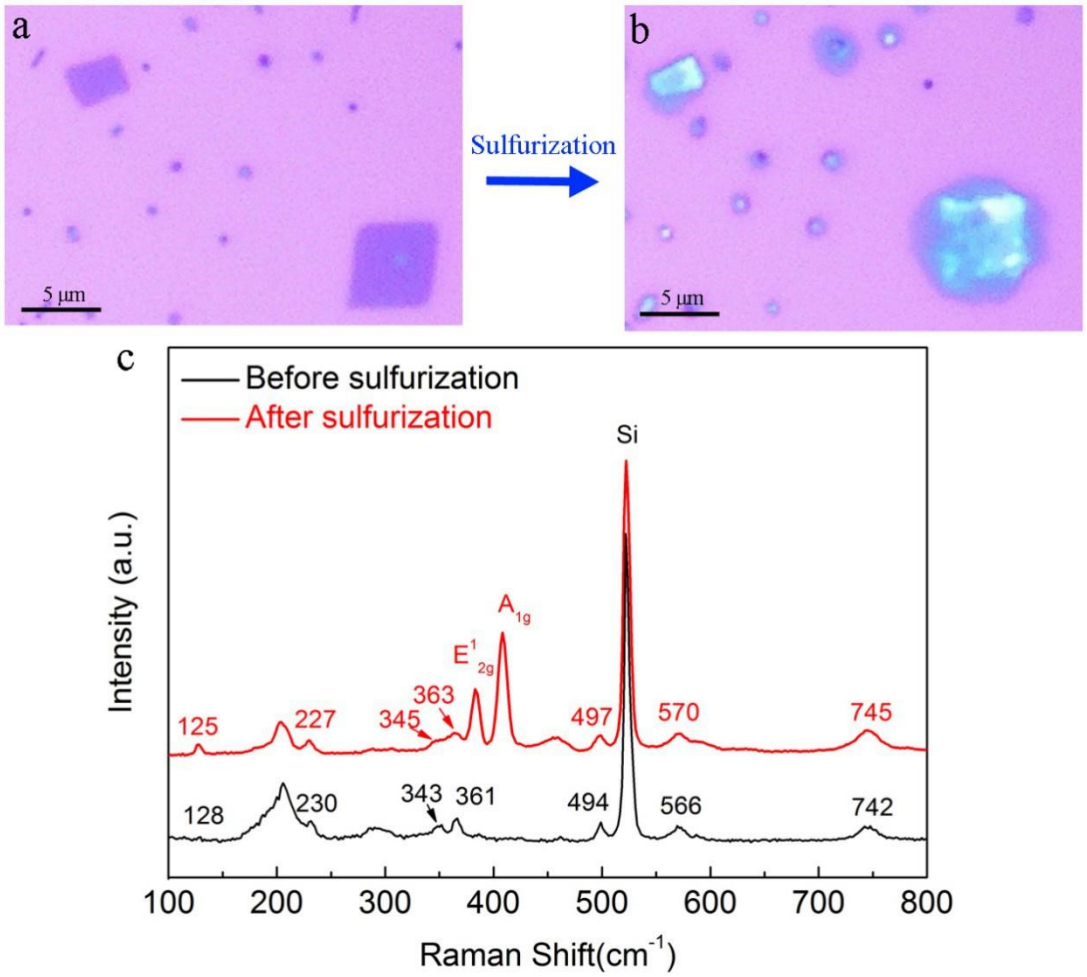

Figure S3. (a) Optical image of quadrilateral CVD products grown before S sulfurization and (b) after sulfurization. (c) The corresponding Raman spectra of quadrilateral CVD products grown before sulfurization and after sulfurization.

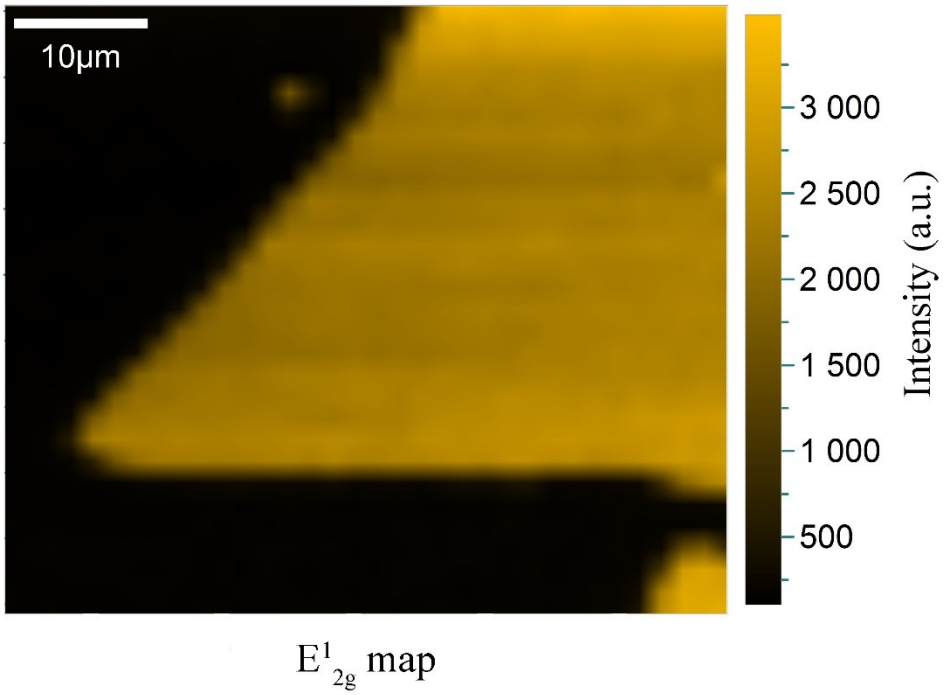

Figure S4. The E^1_{2g} intensity Raman map corresponding to the corner area of the clean and pure MoS_2 grain shown in the up right of Figure 4a.

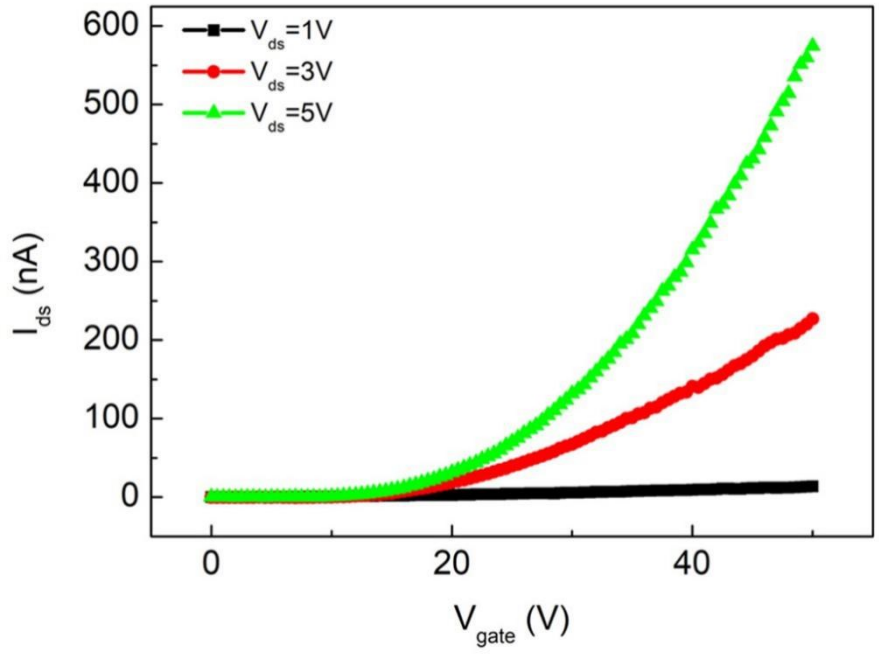

Figure S5. Transfer characteristics curves (I_{ds}-V_{gate}) of the FET device based on clean and pure MoS_2 at 1, 3, and 5V S-D voltage, respectively.