

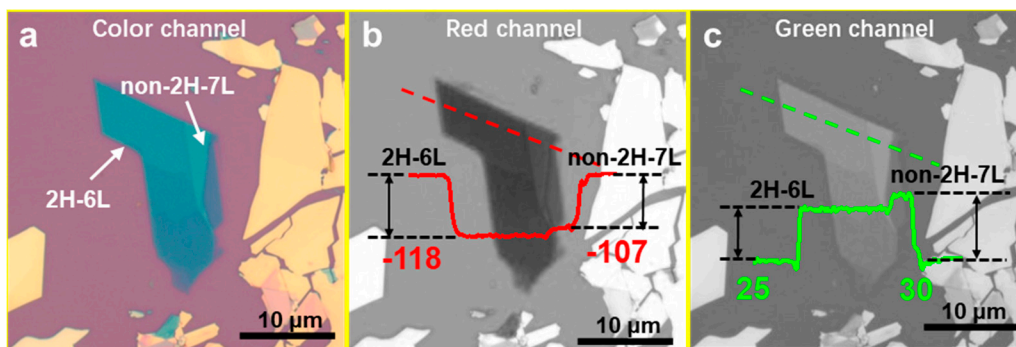
## **Supporting Information**

# **Probing Polymorphic Stacking Domains in Mechanically Exfoliated Two-Dimensional Nanosheets Using Atomic Force Microscopy and Ultralow-Frequency Raman Spectroscopy**

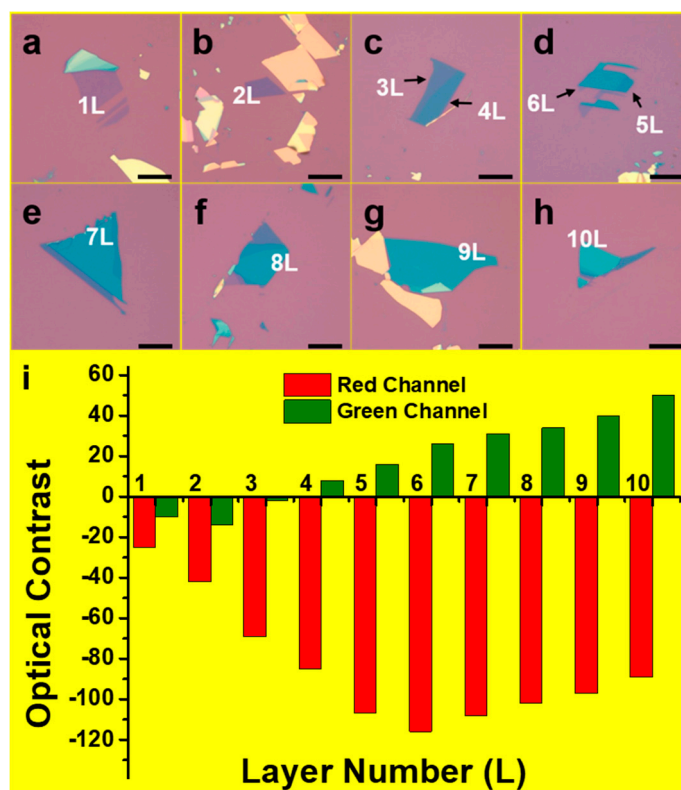
**Chengjie Pei, Jindong Zhang and Hai Li \***

Key Laboratory of Flexible Electronics (KLOFE), Institute of Advanced Materials (IAM), Nanjing Tech University (NanjingTech), 30 South Puzhu Road, Nanjing 211816, China; iampcj@njtech.edu.cn (C.P.); iamjdzhang@njtech.edu.cn (J.Z.)

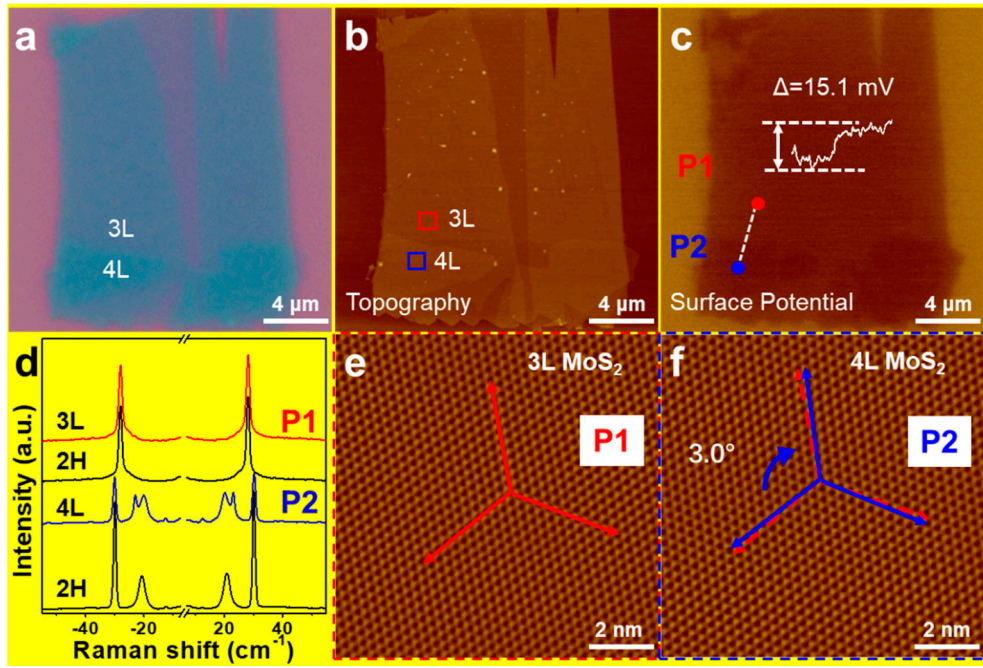
\* Correspondence: iamhli@njtech.edu.cn



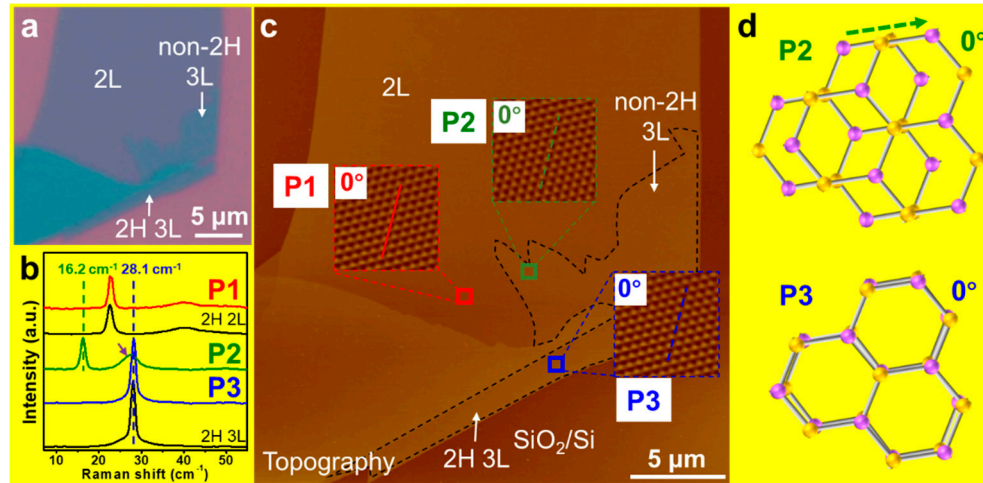
**Figure S1.** (a) color channel image of mechanical exfoliated MoS<sub>2</sub>. (b-c) red and green channel images of mechanical exfoliated MoS<sub>2</sub>.



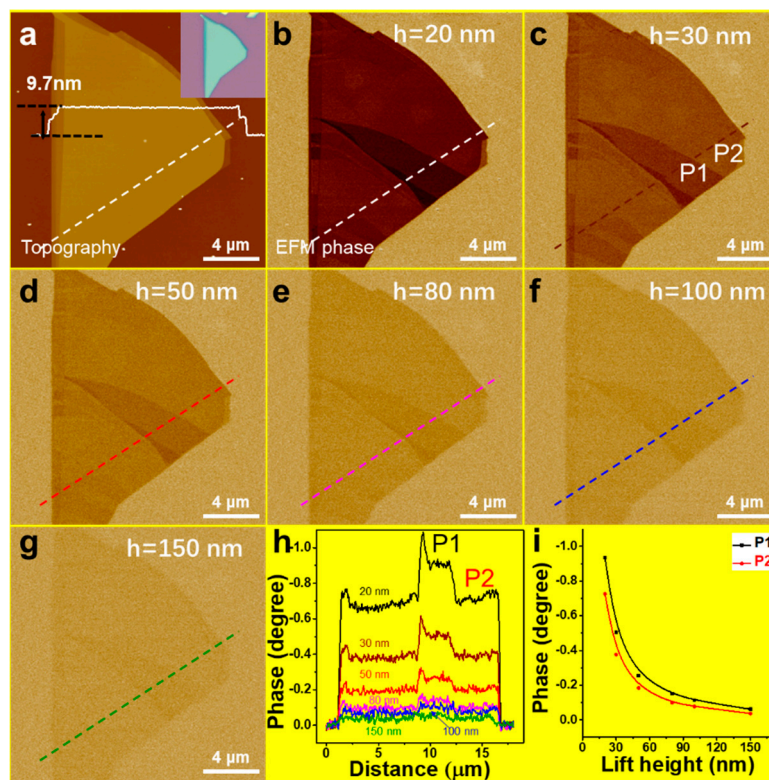
**Figure S2.** (a-h) Optical images of mechanical exfoliated 1-10L MoS<sub>2</sub>, respectively. All the scale bars are 10 μm. (i) Plot of optical contrast difference of 1-10L MoS<sub>2</sub> under red and green channels.



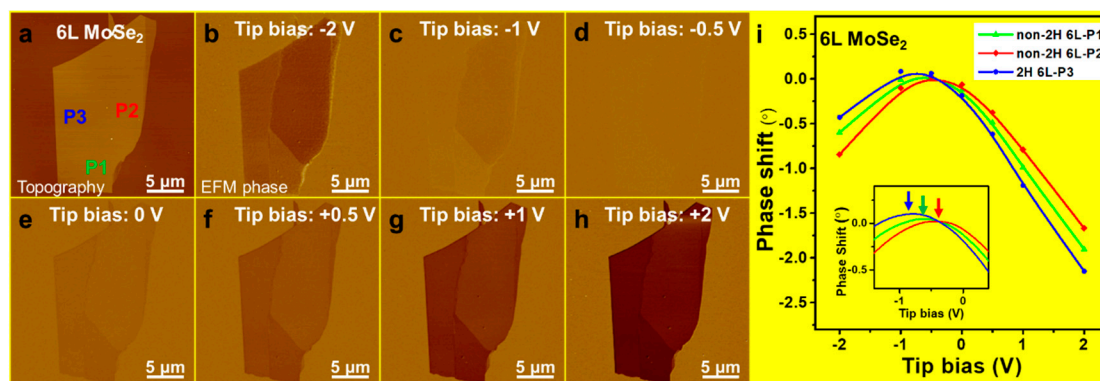
**Figure S3.** (a) Optical image, (b) topography image, (c) surface potential image, (d) Raman spectra, (e-f) and atomic lattice images of polymorphic MoS<sub>2</sub> nanosheet.



**Figure S4.** (a) Optical and (c) AFM topography images, (b) ULF Raman spectra of MoS<sub>2</sub> nanosheet on 300 nm SiO<sub>2</sub>/Si substrate. (d) Simulated atomic lattice images of regions P2 and P3 shown in (c) and according to the measured twist angle.



**Figure S5.** (a) Topography image and (b-g) EFM phase images of polymorphic MoS<sub>2</sub> nanosheet at various lift heights. (h) The phase of dashed lines and the phase shift (i) vs lift height obtained in the EFM measurement on polymorphic MoS<sub>2</sub> nanosheet.



**Figure S6.** (a) AFM topography image, (b-h) EFM phase images of 6L MoSe<sub>2</sub> nanosheets shown in (a) with the tip bias changed from -2 V to +2 V. (i) EFM phase shift as a function of the applied tip bias.