Supporting Information

Assembly of 1T'-MoS_2 based Fibers for Flexible Energy Storage

Hui Pan,[a#] Jingyi Lin,[a#] Xiaoyu Han,[b#] Yao Li,[a] Xin Meng,[a] Ruichun Luo,[a] Joseph James Broughton,[b] Muhammad Imtiaz,[a] Zhixin Chen,[c] Dawei Wang,[d] Shenmin Zhu,[a*] Pan Liu,[a*] Zhengxiao Guo[b,e*]

a. State Key Laboratory of Metal Matrix Composites, School of Materials Science and Engineering, Shanghai Jiao Tong University, Shanghai 200240, China.

b. Department of Chemistry, University College London, London WC1E 6BT, United Kingdom.

c. School of Mechanical, Materials & Mechatronics Engineering, University of Wollongong, Wollongong NSW 2522, Australia.

d. School of Chemical Engineering, UNSW Australia, Sydney NSW 2052, Australia.

e. Departments of Chemistry and Mechanical Engineering, The University of Hong Kong, Hong Kong SAR.

# These authors contribute equally to this paper.

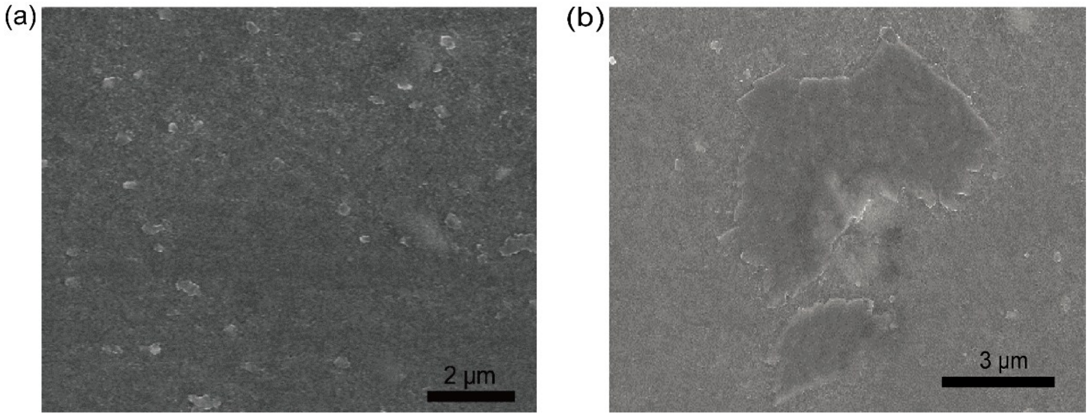

Figure S1. SEM images of the as-fabricated 1T'-MoS2 nanosheets.

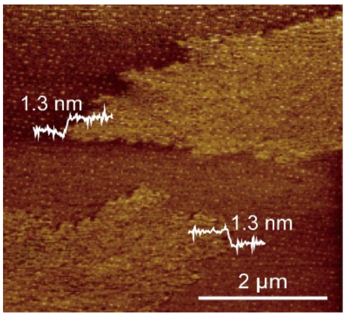

Figure S2. Atomic Force Microscope (AFM) of 1T'-MoS_2 nanosheet. The as-fabricated nanoflake share the same height of 1.3 nm.

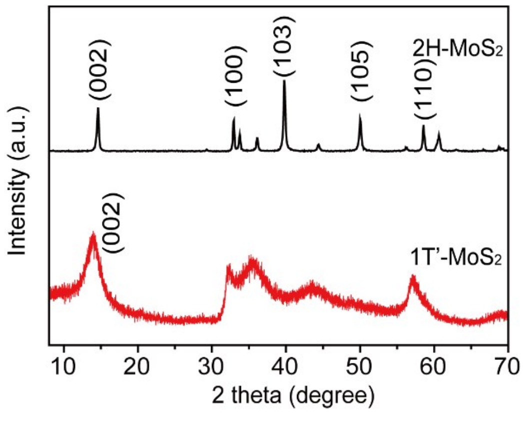

Figure S3. The XRD of as-fabricated 1T'-MoS_2, compared with 2H-MoS_2.

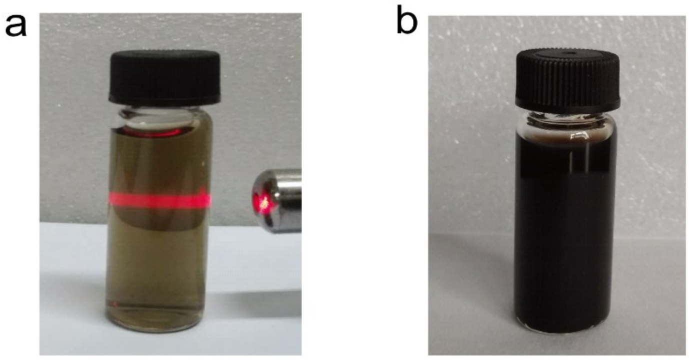

Figure S4. 1T'-MoS_2 solutions with concentration of 0.01 wt% (a) and 1 wt% (b), respectively, showing the good solubility and faintly acidity with pH = 5.5.

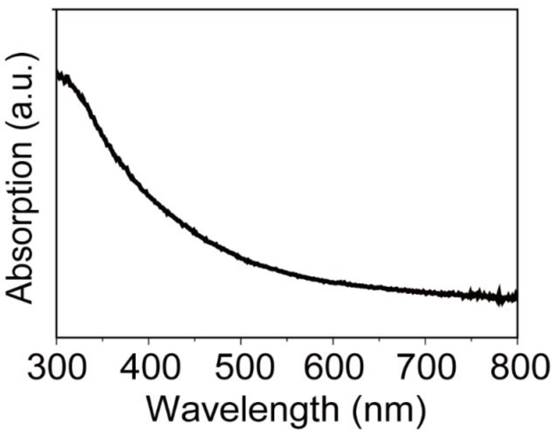

Figure S5. UV-vis spectrum of 1T'-MoS_2 suspension (0.01 wt%).

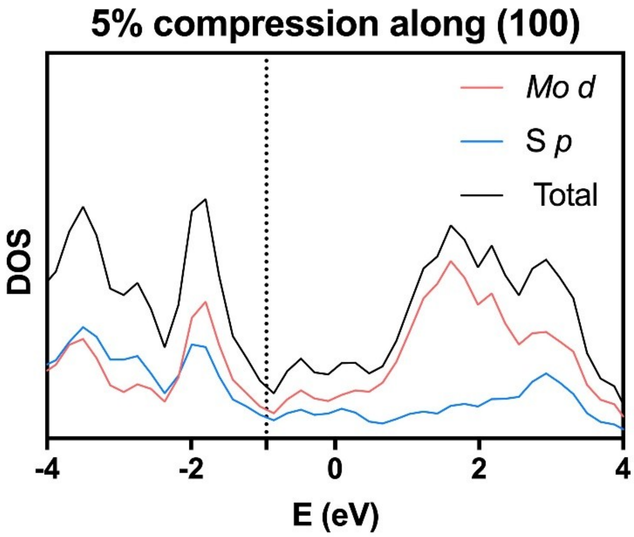

Figure S6. The DOS of 1T'-MoS_2 with 5% compression strain along (100) direction.

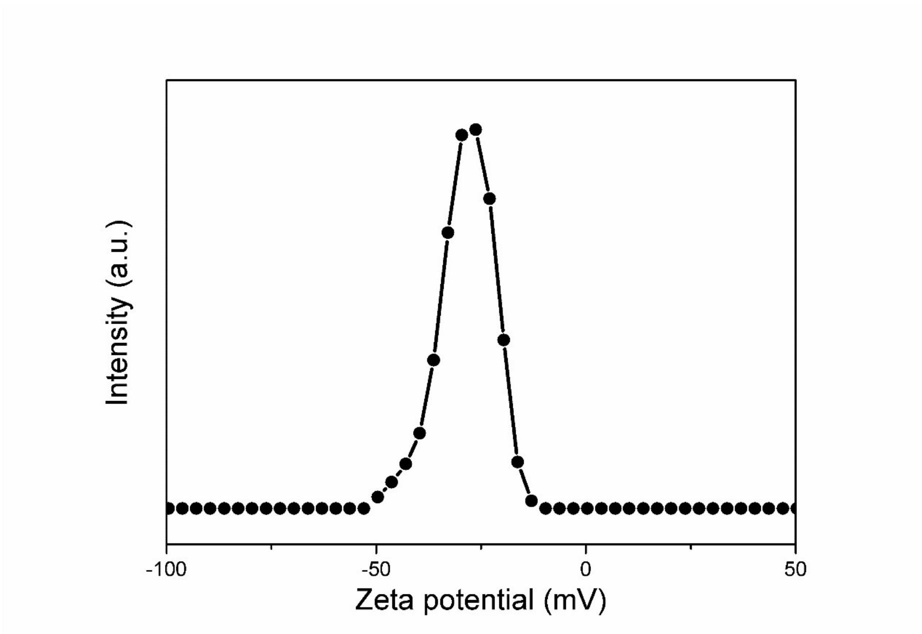

Figure S7. Zeta potential of dilute 1T'-MoS_2 suspension (0.01 wt%).

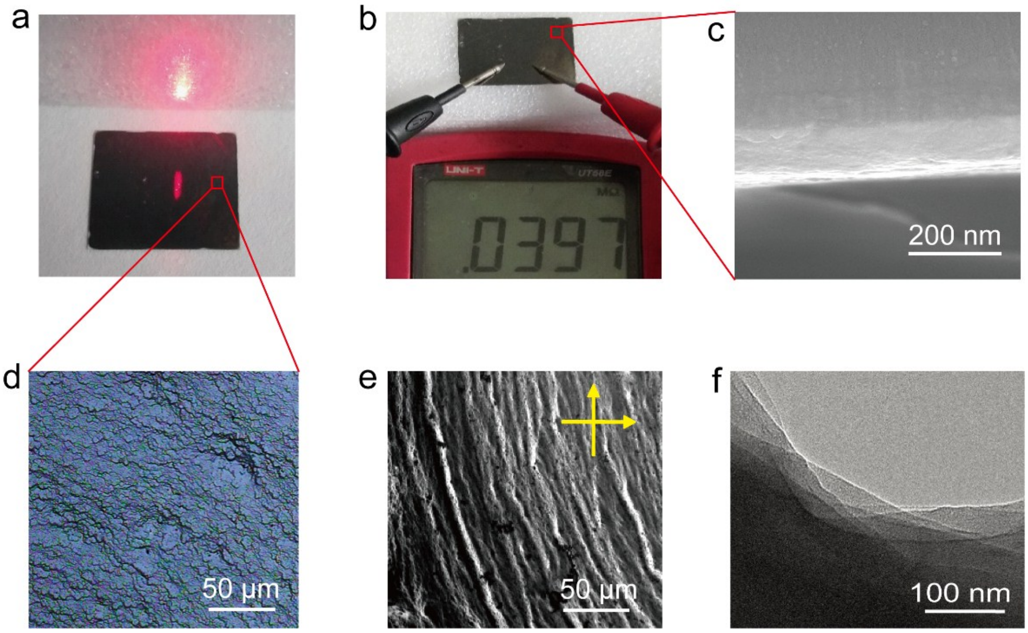

Figure S8. (a) A 1T'-MoS_2 film on a glass showing metal luster with good light reflection property. (b) A 1T'-MoS_2 film has good conductivity indicated by an AVO meter. (c) The cross-section of (b) showing a thickness of ~150 nm. (d,e,f) Optical (d), POM (e) and TEM (f) images of 1T'-MoS_2 film in (a).

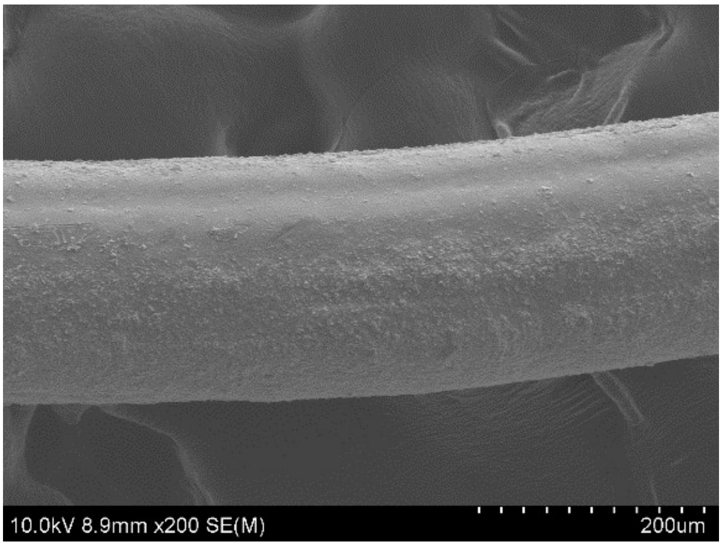

Figure S9. SEM image of a thick 1T'-MoS_2 fiber.

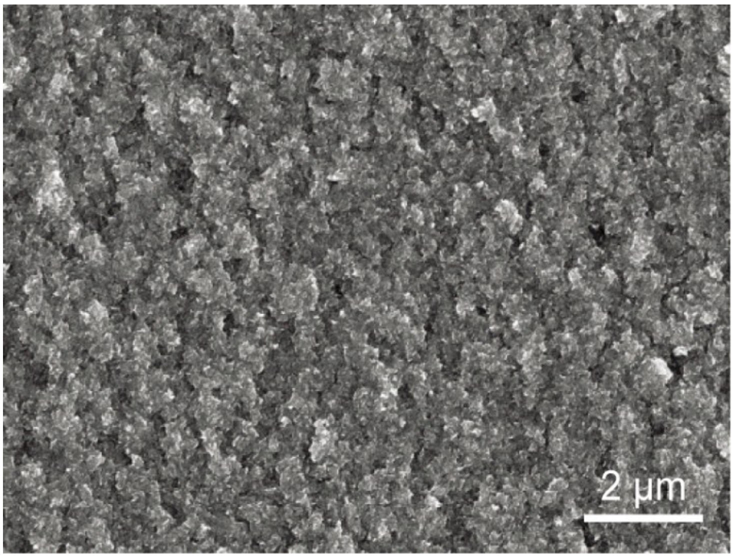

Figure S10. SEM image of inner structure of a 1T'-MoS_2 fiber.

Table S1 The lattice parameters (Å) and bond lengths (Å) of 1T'-MoS_2, compared with previous CVD growth 1T'-MoS_2.

	a	b	Mo-S bond length	Mo-Mo distance
Our work (theory)	6.576	3.196	2.441	3.256
Previous experimental data	6.55	3.18	2.456	3.276
Our work (experiment)	6.17	3.15		

Table S2 Comparison of Supercapacitor Performance Parameters of the 1T'-MoS_2/GO fiber with Previously Reported Materials.

Electrode Material	Electrolyte	Specific Capacitance	Ref.
CNT/rGO fiber	1M H_2SO_4	305 F cm^{-3} at 73.5 mA cm^{-3}	[1]
PPy/G fiber	1 M $NaClO_4$	115 mF cm^{-2} at 0.2 mA cm^{-2}	[2]
Stainless wire/rGO fiber	1 M LiCl	16.8 F cm^{-3} at 10 mV s^{-1}	[3]
MoO_3/rGO fiber	1M H_2SO_4	321.8 F cm^{-3} at 2 mV s^{-1}	[4]
MWCNTs/MnO_2 film	0.3 M $K_3[Fe(CN)_6]$ + 1 M Na_2SO_4	1012 F g^{-1} at 2 mA cm^{-2}	[5]
1T'-MoS2/GO fiber	0.2 M $K_3[Fe(CN)_6]$ + 0.2 M $K_4[Fe(CN)_6]$	1379.8 F cm^{-3} (645 F g^{-1}) at 10 mV s^{-1}	This work

References:

[1] D. Yu, K. Goh, H. Wang, L. Wei, W. Jiang, Q. Zhang, L. Dai, Y. Chen, Scalable synthesis of hierarchically structured carbon nanotube-graphene fibres for capacitive energy storage, Nature nanotechnology, 9 (2014) 555-562.
[2] X.T. Ding, Y. Zhao, C.G. Hu, Y. Hu, Z.L. Dong, N. Chen, Z.P. Zhang, L.T. Qu, Spinning fabrication of graphene/polypyrrole composite fibers for all-solid-state, flexible fibriform supercapacitors, J Mater Chem A, 2 (2014) 12355-12360.
[3] K. Guo, X.F. Wang, L.T. Hu, T.Y. Zhai, H.Q. Li, N. Yu, Highly Stretchable Waterproof Fiber Asymmetric Supercapacitors in an Integrated Structure, Acs Applied Materials & Interfaces, 10 (2018) 19820-19827.
[4] W.J. Ma, S.H. Chen, S.Y. Yang, W.P. Chen, W. Weng, Y.H. Cheng, M.F. Zhu, Flexible all-solid-state asymmetric supercapacitor based on transition metal oxide nanorods/reduced graphene oxide hybrid fibers with high energy density, Carbon, 113 (2017) 151-158.
[5] N.R. Chodankar, D.P. Dubal, A.C. Lokhande, A.M. Patil, J.H. Kim, C.D. Lokhande, An innovative concept of use of redox-active electrolyte in asymmetric capacitor based on MWCNTs/MnO2 and Fe2O3 thin films, Scientific Reports, 6 (2016).