Supporting information

Boosting the Sodium Storage of 1T/2H $MoS_2@SnO_2$ Heterostructure via Fast Surface Redox Reaction

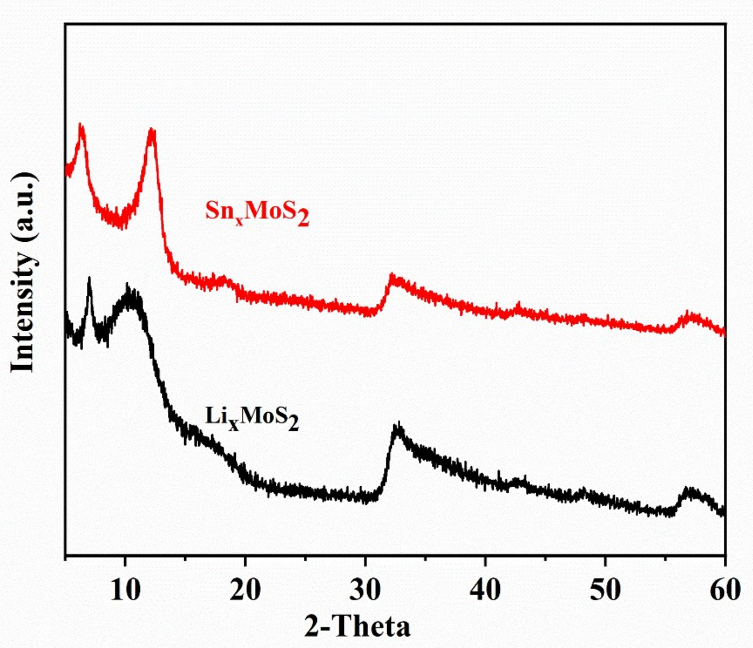

Figure S1. XRD pattern of Li^+ and Sn^{2+} intercalted MoS2. The XRD peaks corresponding to (001) and (002) reflections were found, suggesting there is a water bilayer in the as-deposited film.

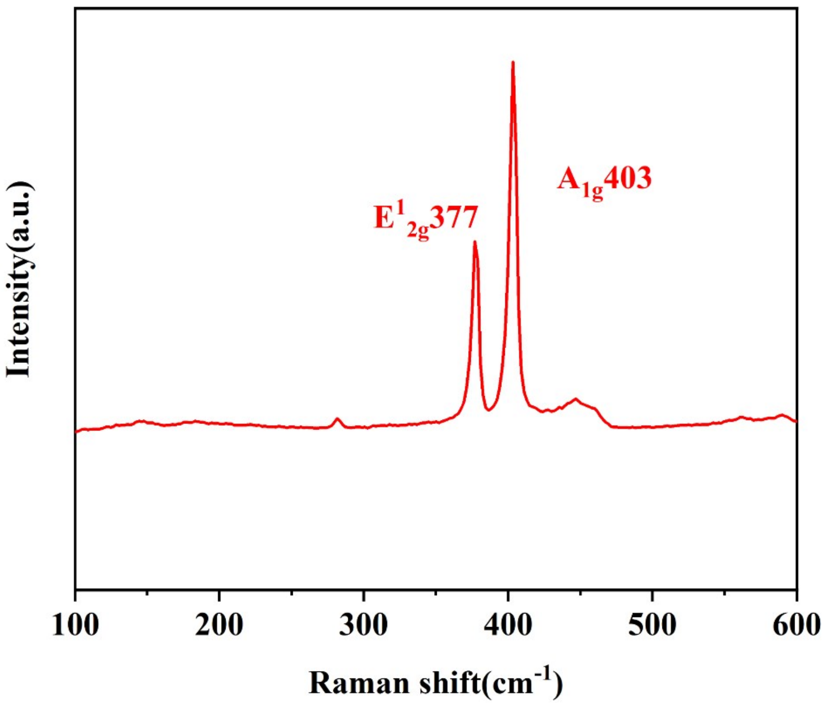

Figure S2. Raman spectra of 2H $MoS_2@SnO_2$

Supporting information

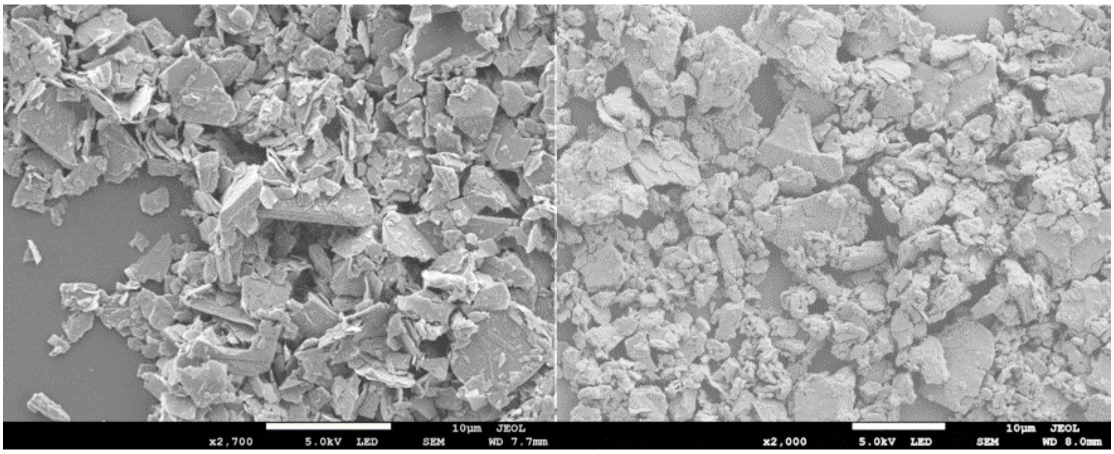

Figure S3. SEM images of raw MoS_2 and 1T/2H MoS_2@SnO_2

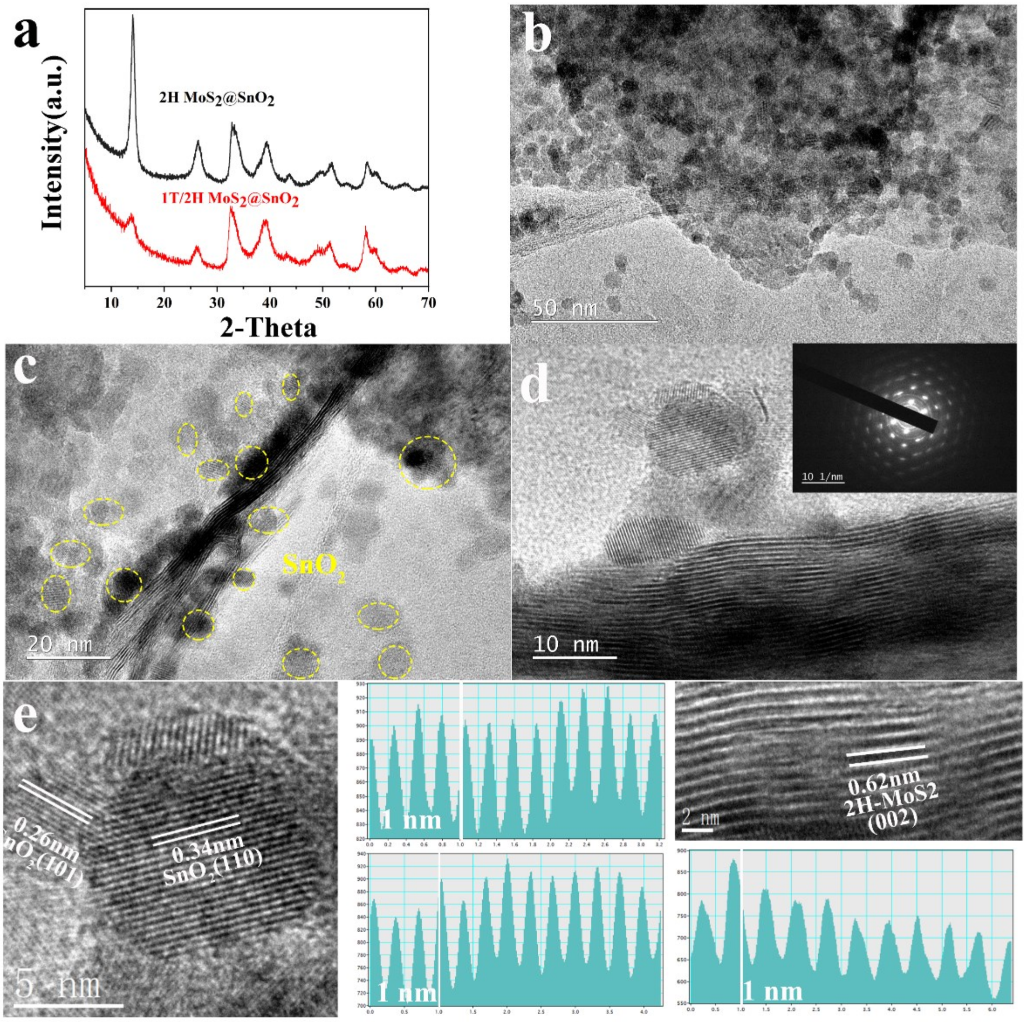

Figure S4. a) XRD patterns of 2H MoS_2@SnO_2 and 1T/2H MoS_2@SnO_2. b-d) TEM images of 2H MoS_2@SnO_2, the inset of d shows the corresponding SEAD pattern. e) The HRTEM images of 2H MoS_2@SnO_2, and their corresponding profile plots of the calibration for measuring the spacings in panel of SnO_2 and 2H-MoS_2.

Supporting information

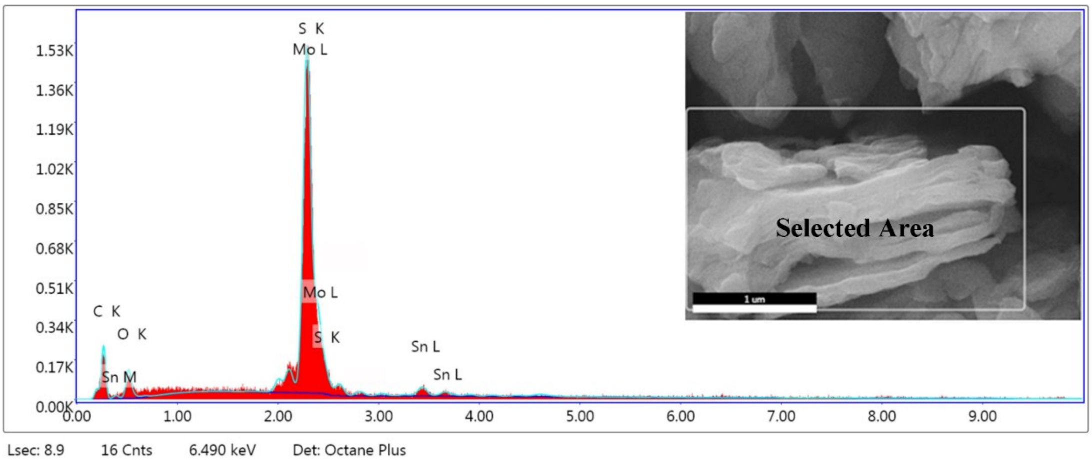

Figure S5. The energy dispersive X-ray spectrum of 1T/2H MoS_2@SnO_2.

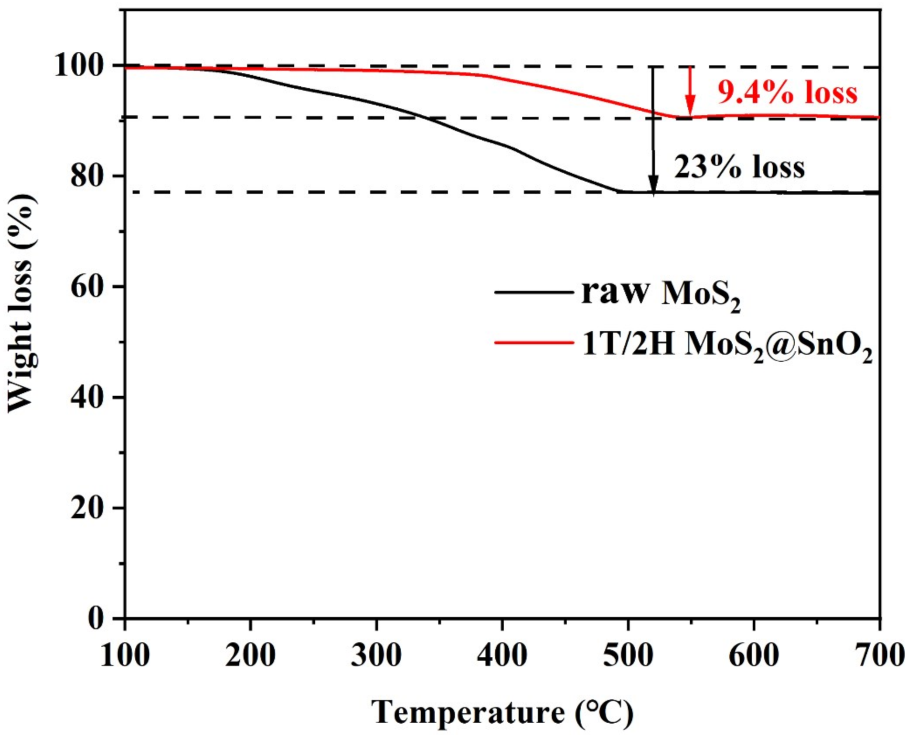

Figure S6. TGA curves of 1T/2H MoS_2/SnO_2 composite (without graphene) and bulk MoS_2. Assuming the weigh percent of MoS_2 and SnO_2 are x, y respectively. The mass ratio of MoS_2 and SnO_2 is calculated to be 40.9:59.1 based on the following equations: x+y=1 and 77%x+y=90.6%.

Supporting information

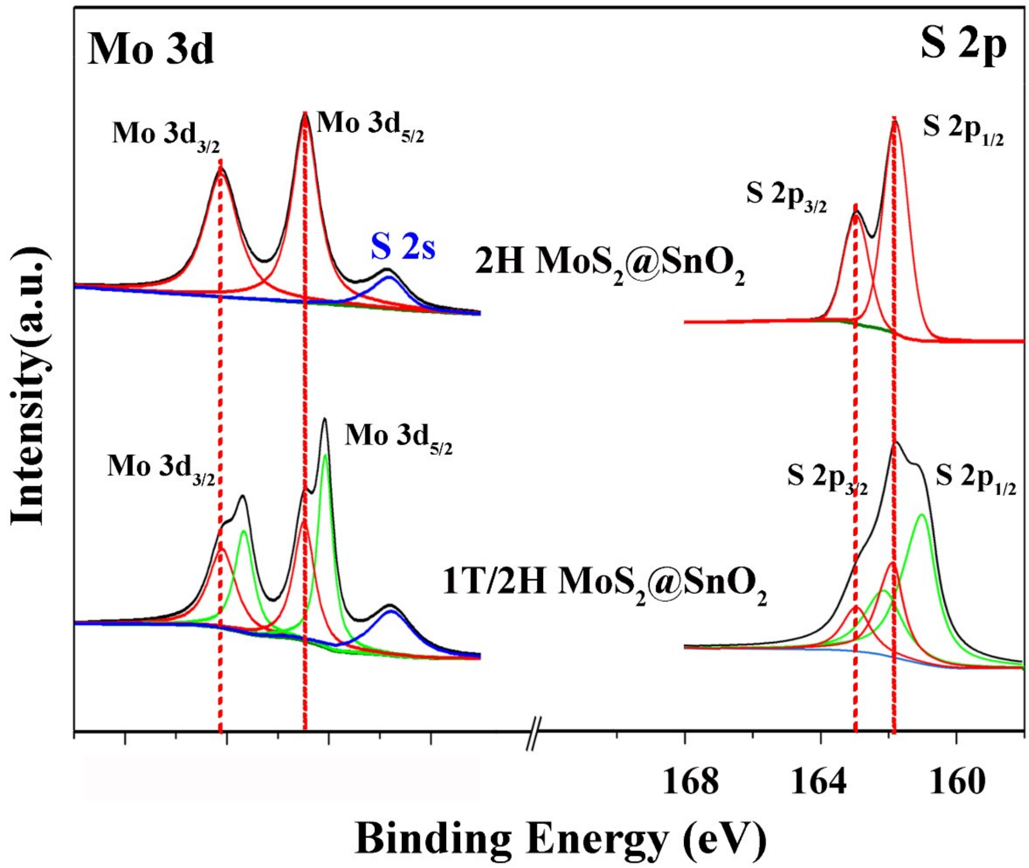

Figure S7. High resolution XPS spectra of Mo 3d and S 2p in 2H MoS_2@SnO_2 and 1T/2H MoS_2@SnO_2, respectively.

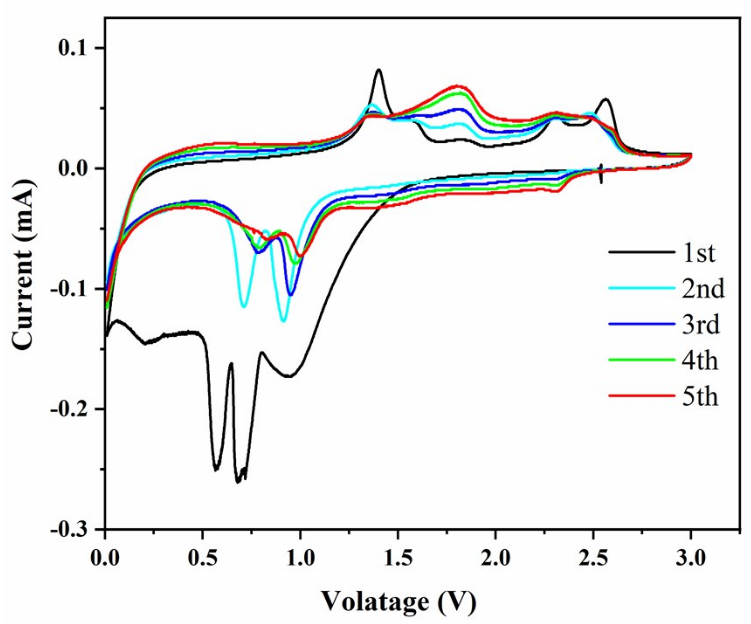

Figure S8. CV curves of raw MoS_2 for the initial 5 cycles.

Supporting information

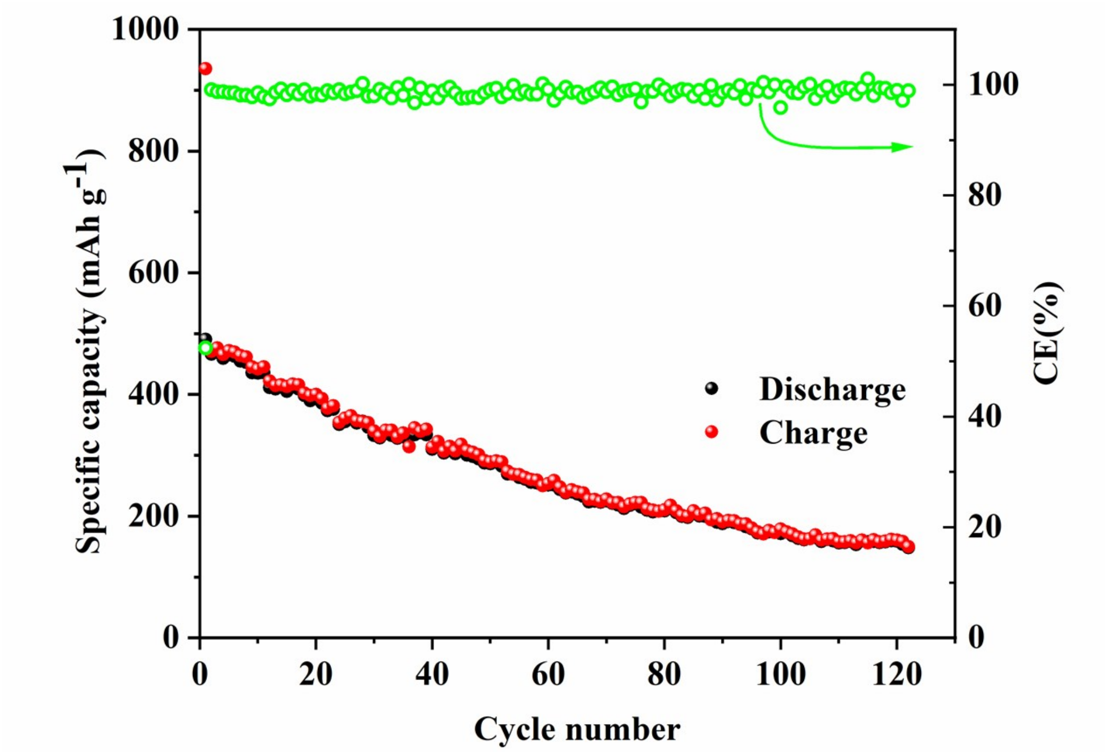

Figure S9. Cycling performance and CE of the exfoliated MoS_2.

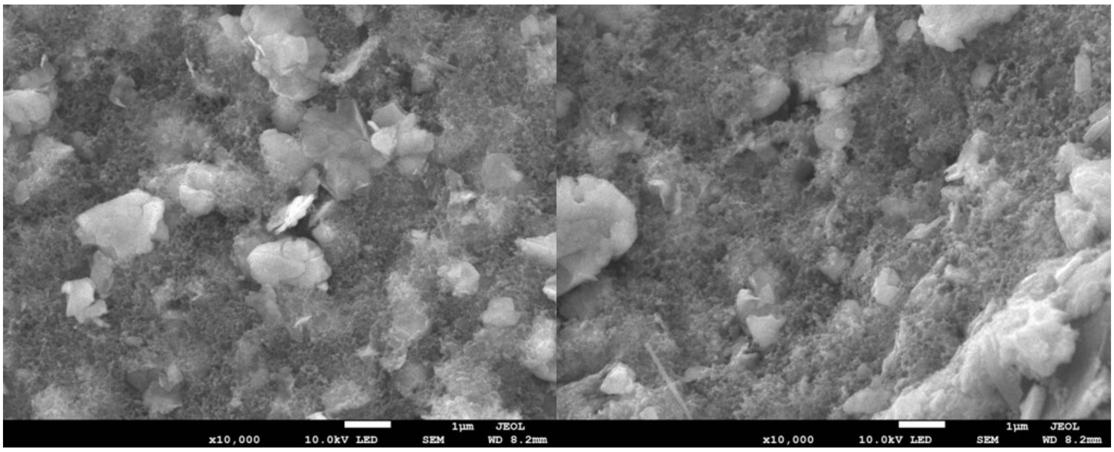

Figure S10. a) SEM images of a) initial and b) cycled anode.

Supporting information

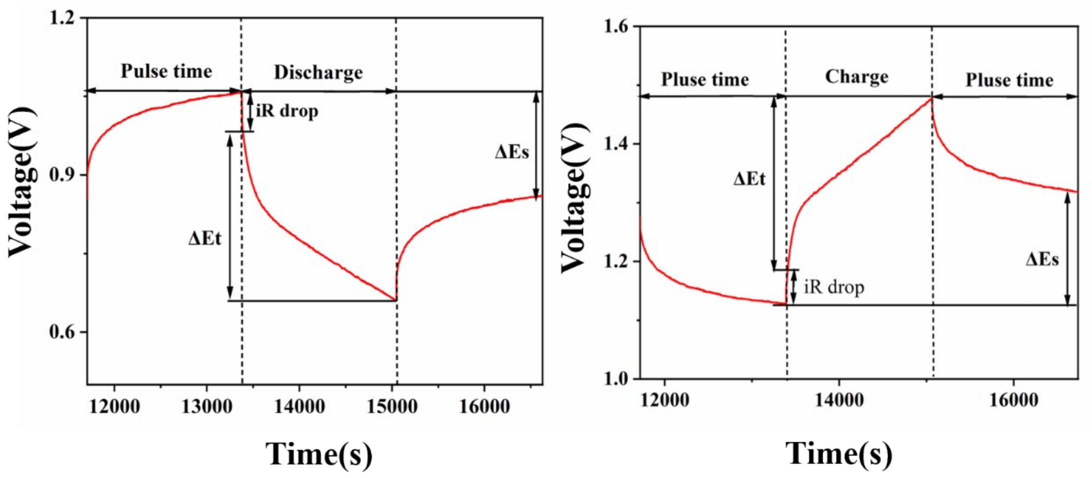

Figure S11. Typical E-t curves of 1T/2H MoS_2@SnO_2 for a single GITT step during charge and discharge.

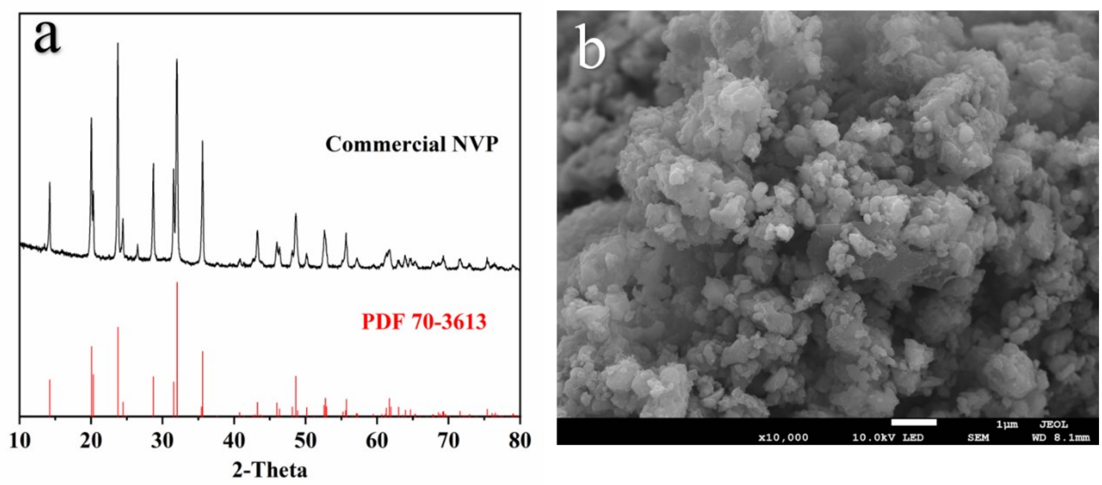

Figure S12. a) XRD pattern and b) SEM image of NVP

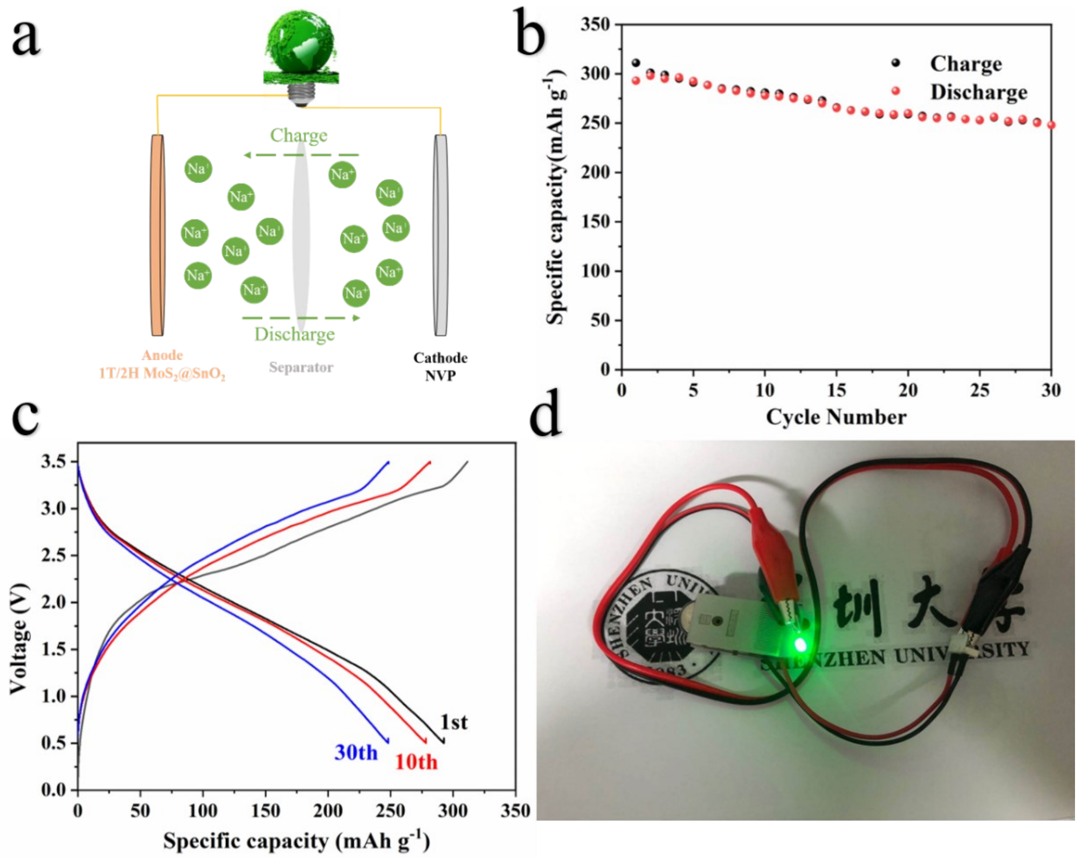

Figure S13. a) Schematic illustration of full-cell test. b) cycling performance of the full cell at 0.5 A g^{-1}. c) charge and discharge curves of 1T/2H MoS2@SnO2//NVP d) small lamp was lighten by full cell.

Supporting information

Table S1. Comparation of the achievement on SIB anode of the published literature against the current work.

Material	Preparation method	Cyclic performance	Rate performance	Ref.
1T/2H MoS2@SnO2	Charge-induced self-assembly	537mAh g^{-1} at 0.1A g^{-1} after 100 cycle	262mAh g^{-1} at 2A g^{-1} after 500 cycles	This work
Dual phase-MoS2	Solvothermal	300mAh g^{-1} at 0.5Ag^{-1} after 200 cycles	220mAh g^{-1} at 2.0 A g^{-1} after 500 cycles	S[1]
1T MoS_2/CF	Solvothermal	313mAh g^{-1} at 0.05 A g^{-1} after 200 cycles	175mAh g^{-1} at 2.0 A g^{-1} after 200 cycles	S[2]
$MoS_{2x}Se_x$/GF	Hydrothermal and calcination	165mAh g^{-1} at 0.2 A g^{-1} after 500 cycles	175mAh g-1 at 2.0 A g-1 after 500 cycles	S[3]
MoS_2@SnO_2@C	Hydrothermal	396mA h g^{-1} at 0.1 A g^{-1} after 150 cycles	230mAh g^{-1} at 1.0 A g-1 after 450 cycles	S[4]
S/MoS_2	Calcination	413.2mA h g^{-1} at 0.1 A g^{-1} after 60 cycles	302mAh g^{-1} at 2.0 A g-1 after 300 cycles	S[5]
MoS_2/Graphene	Ball-milling	432mA h g^{-1} at 0.1 A g^{-1} after 60 cycles	421mAh g^{-1} at 0.3 A g^{-1} after 300 cycles	S[6]
1T MoS2	Li intercalated exfoliation	450mA h g^{-1} at 0.05 A g^{-1} after 40 cycles	324mAh g^{-1} at 1.0 A g^{-1} after 200 cycles	S[7]
G-MoS_2	Vapor synthesis	312mA h g^{-1} at 0.5 A g^{-1} after 300 cycles	175mAh g^{-1} at 2.0 A g^{-1} after 400 cycles	S[8]

Supporting information

Reference

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