

Fabrication of Novel Lamellar Alternating Nitrogen-Doped Microporous Carbon Nanofilm/MoS₂ Composites with High Electrochemical Properties

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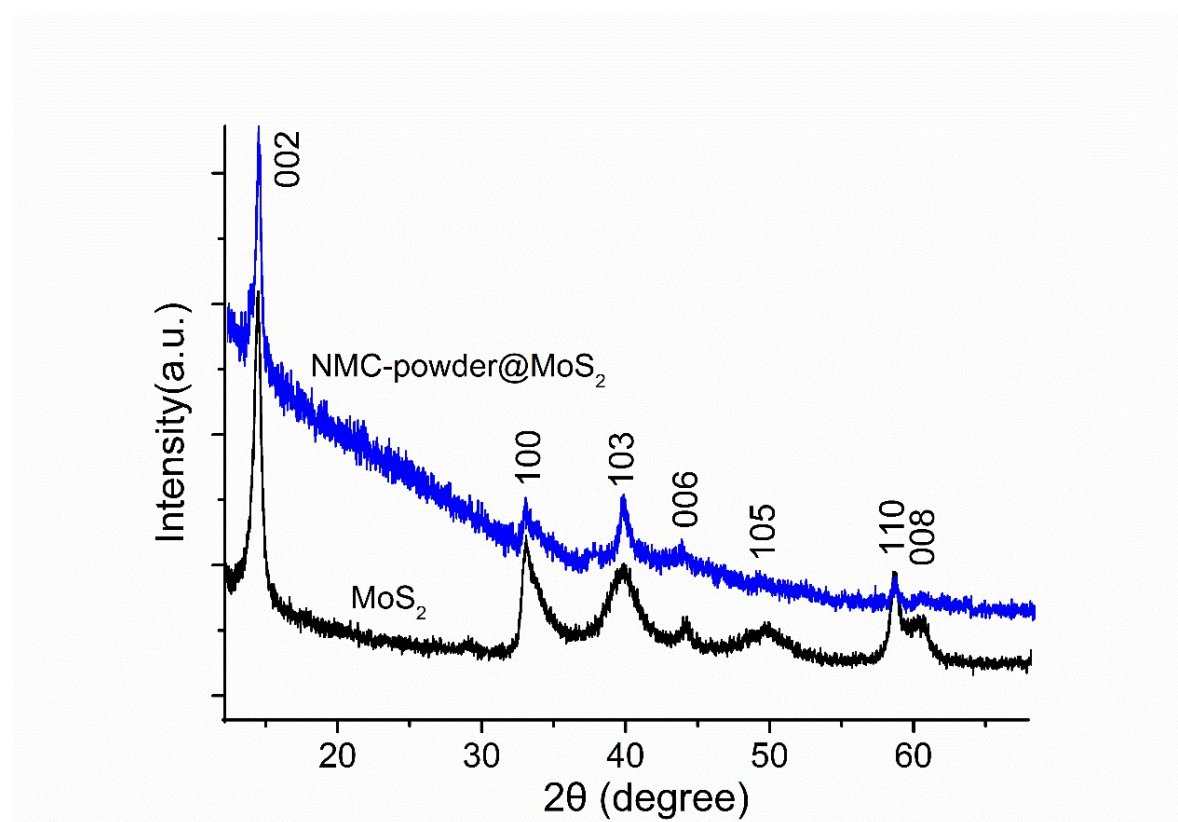


Fig. S1. XRD pattern of NMC-powder@MoS₂ and MoS₂.

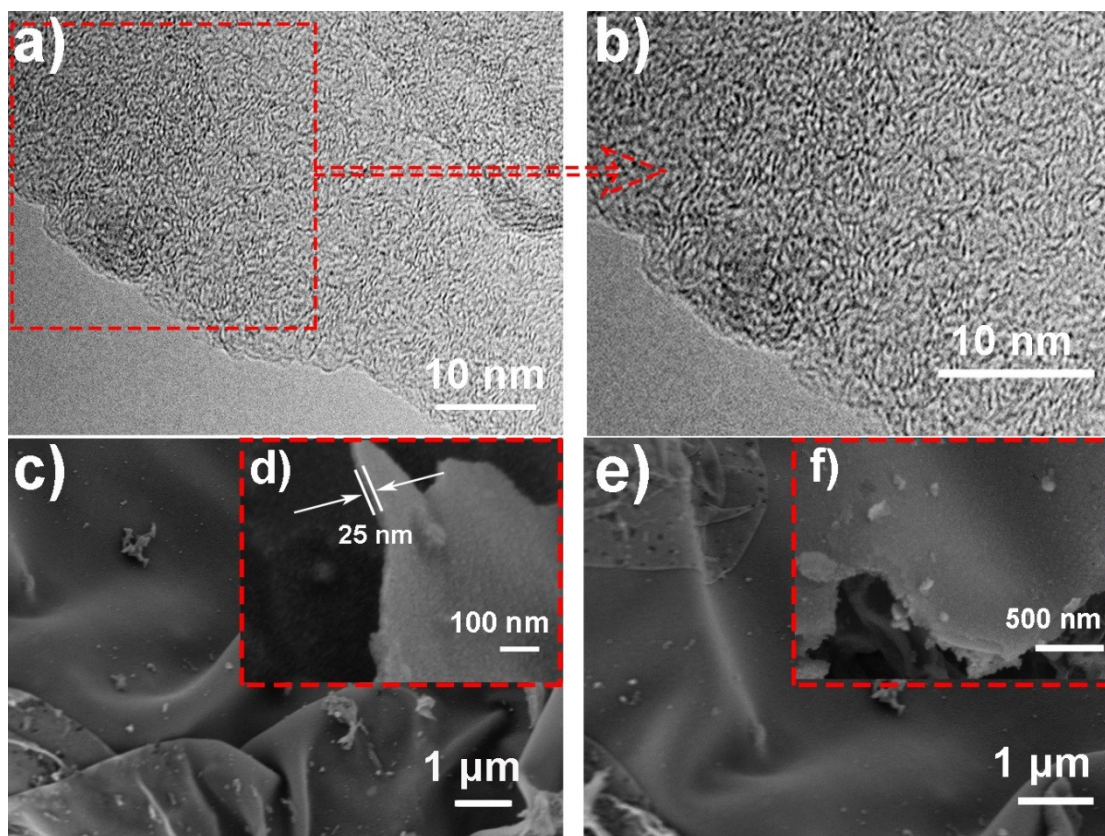


Fig. S2. a,b) HR-TEM images and c-f) Surface SEM images of NMC nanofilms. d)

The cross section of NMC nanofilm shows the thickness is 25 nm, f) the enlarge SEM image of NMC nanofilm.

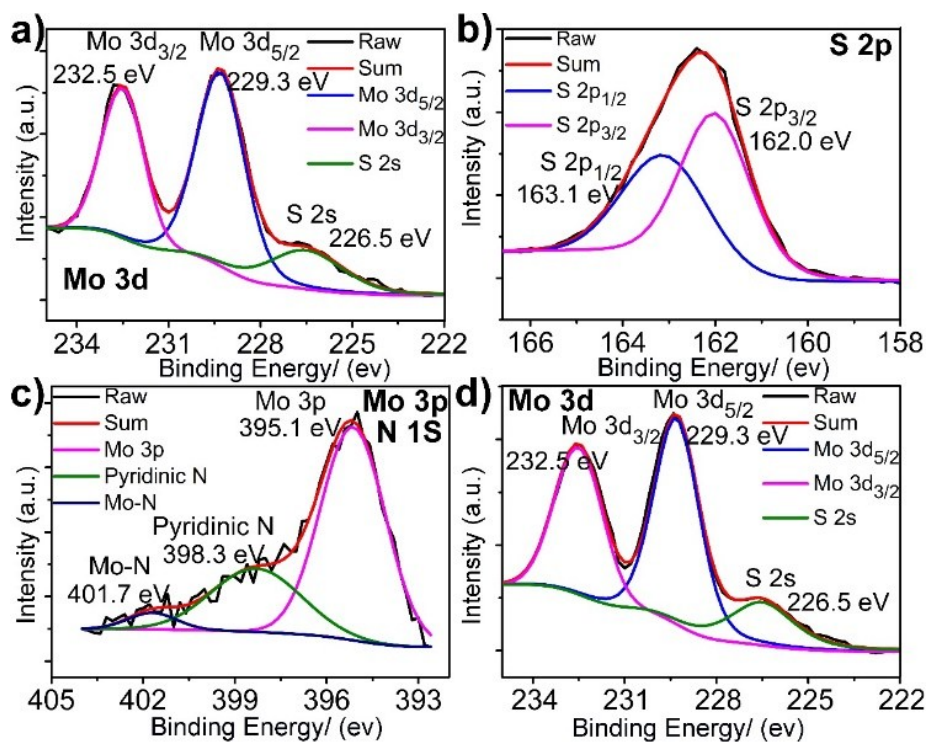


Fig. S3. a) Mo 3d, b) S 2p and c) Mo 3p and N 1s XPS spectra of NMC-nanofilm@MoS₂. d) Mo 3d XPS spectra of pure MoS₂.

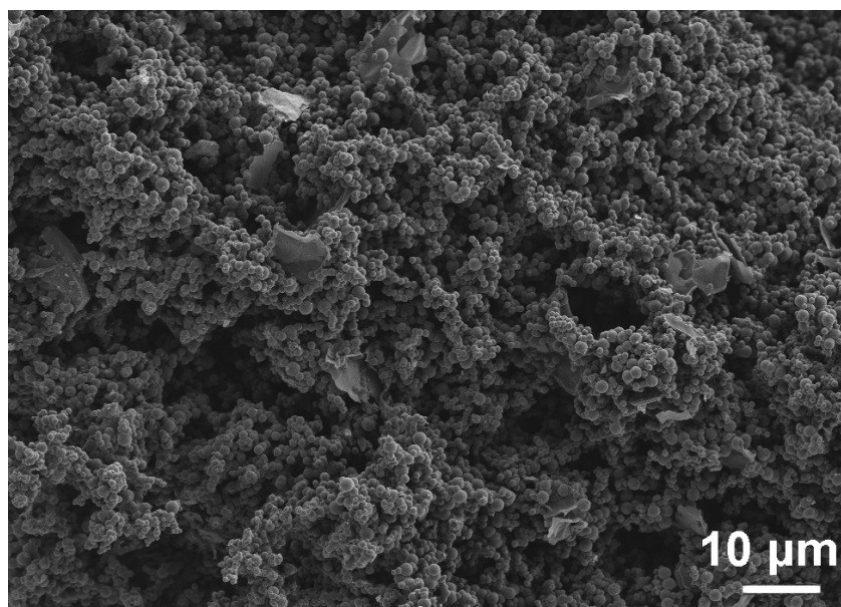


Fig. S4. SEM image of MOP powders.

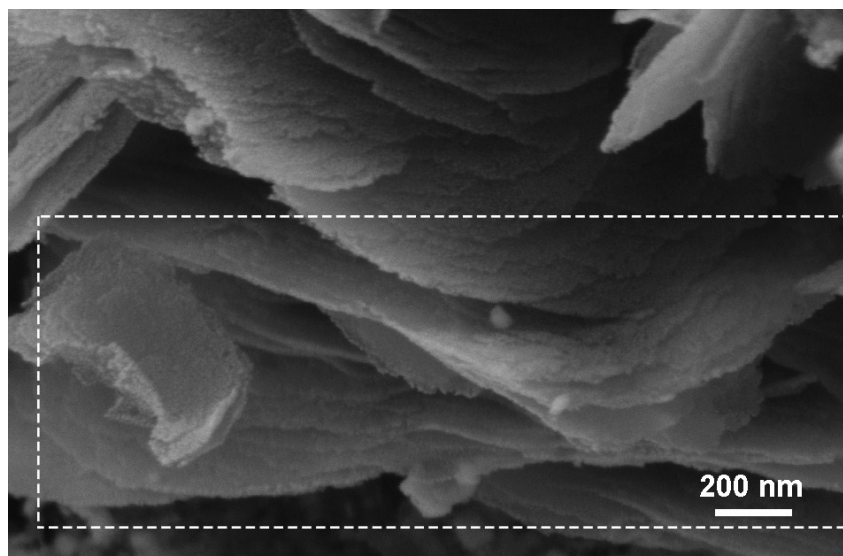


Fig. S5. SEM image of the layer-by-layer stacking of NMC-nanofilm@MoS₂.

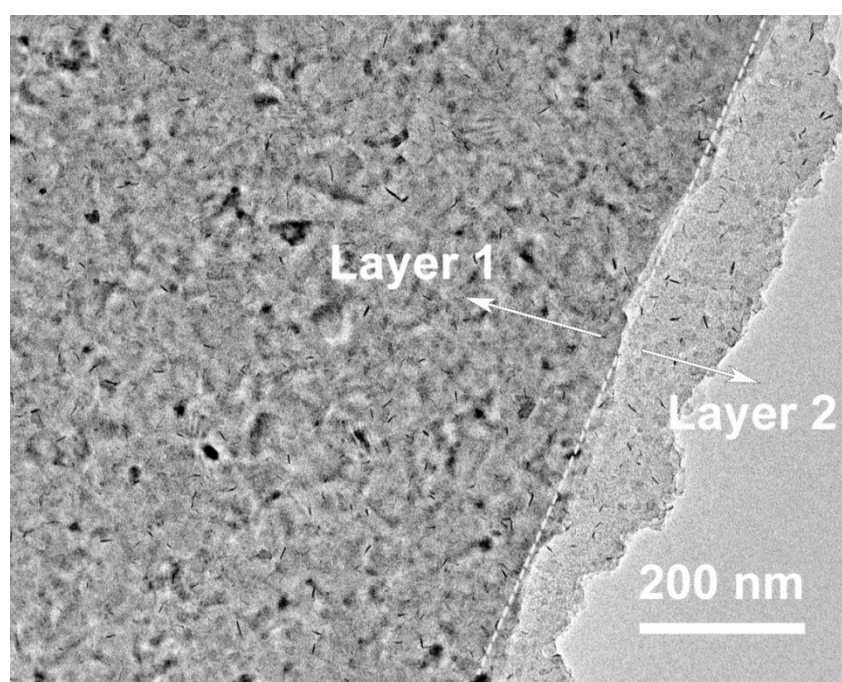


Fig. S6. TEM image of the layer-by-layer stacking of NMC-nanofilm@MoS₂.

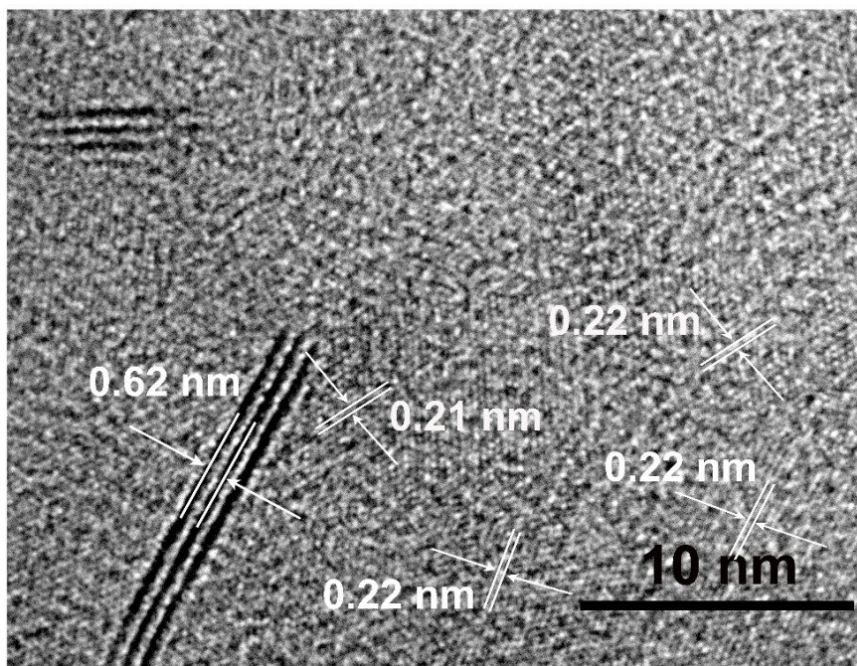


Fig. S7. HR-TEM image of NMC-nanofilm@MoS₂.



Fig. S8. EDS sum spectra of NMC-nanofilm@MoS₂, Mo: S= 1: 1.98 (atomic ratio).

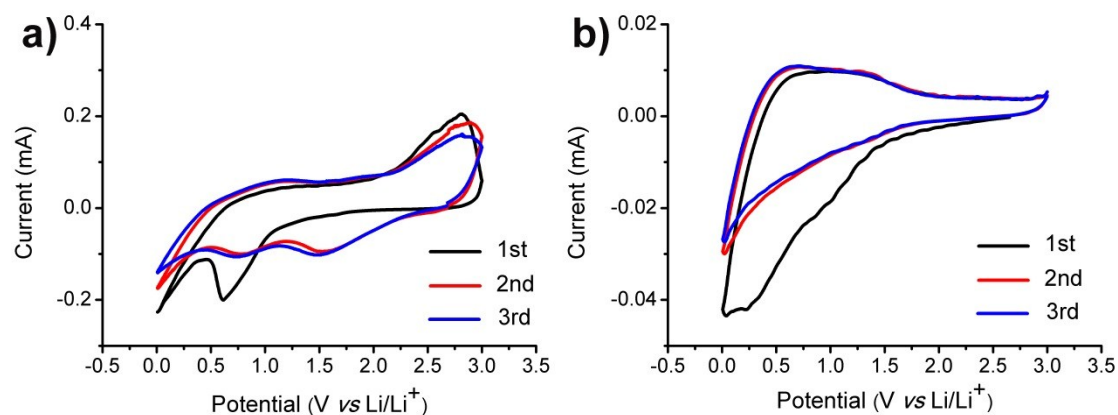


Fig. S9. a) CV curves of the MoS₂ powders and b) CV curves of the NMC nanofilms, for the first three cycles at a scan rate of 0.05 mVs⁻¹ between 0.005 and 3.0 V.

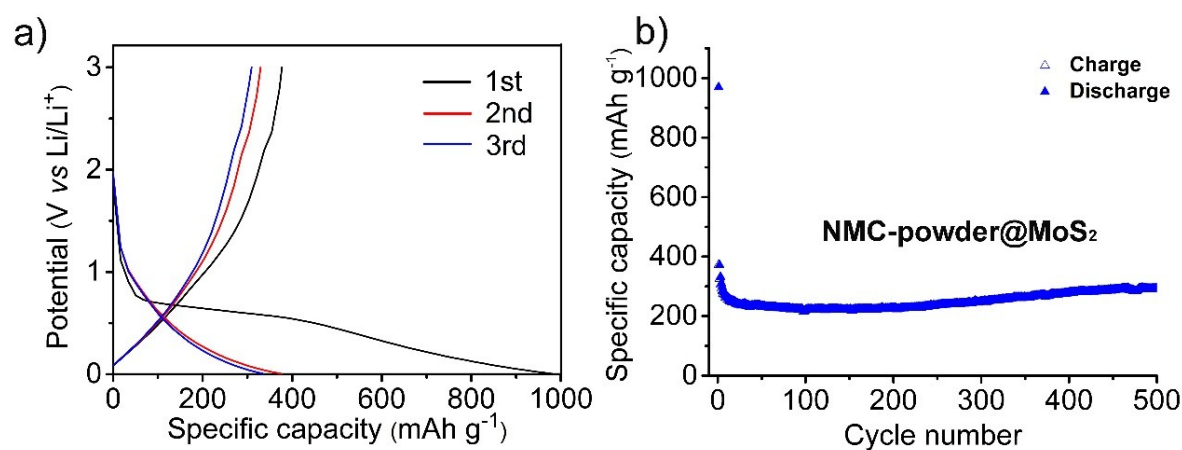


Fig. S10. a) Charge/discharge curves of the NMC-powder@MoS₂ for the first three cycles at a current density of 1.0 A g⁻¹ between 0.005 and 3.0 V. b) Cycling behaviors of NMC-powder@MoS₂ at current density of 1.0 A g⁻¹.

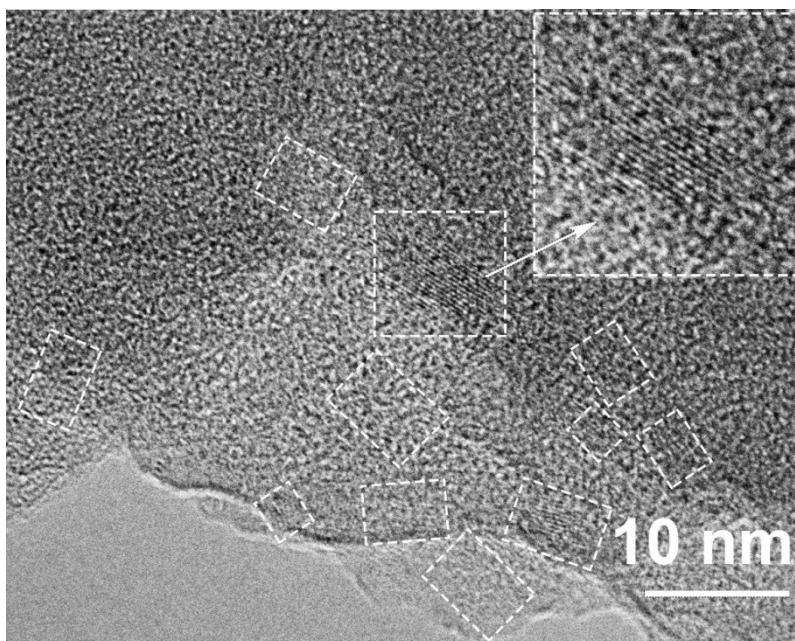


Fig. S11. HR-TEM image of NMC-powder@MoS₂ after 500 charge/discharge cycles at 1.0 A g⁻¹.

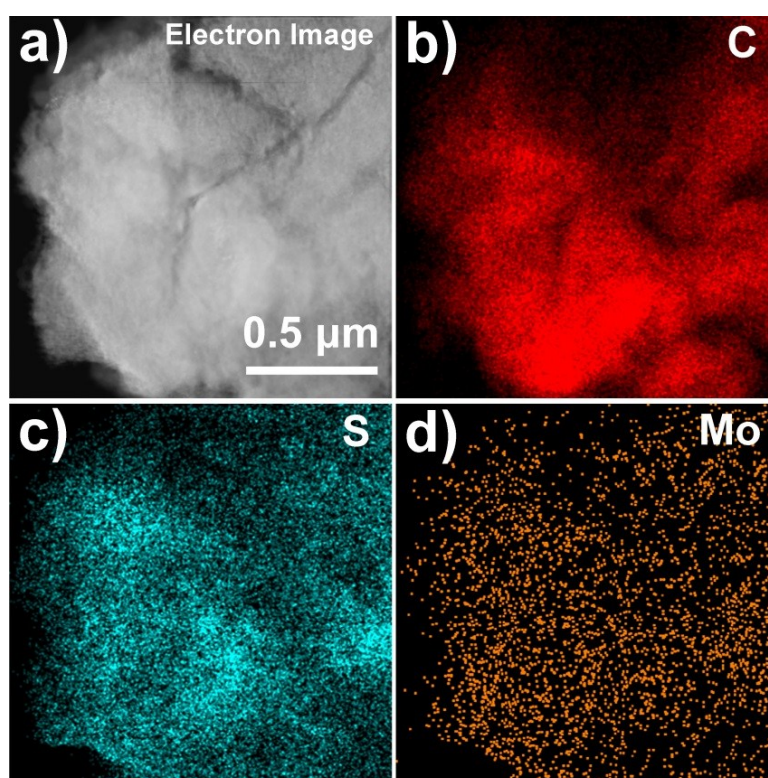


Fig. S12. a) EDS electron image and b-d) EDS Element mapping of NMC-nanofilm@MoS₂ after 500 charge/discharge cycles at 1.0 A g⁻¹.

Table S1. Comparison of specific capacity at different current densities for NMC-nanofilm@MoS₂ electrode with those MoS₂-based electrodes reported previously.

Materials	Current density (A g⁻¹)	Cycle number	Capacity (mAh g⁻¹)	Ref.
NMC-nanofilm @MoS₂	1.0 2.0	500 2000	1190 908	This work
2D-Mesoporous-Carbon@MoS ₂	10	300	400	[1]
CNT/MoS ₂ hybrids	5.0	1000	800	[2]
Monolayer MoS ₂ -graphene hybrid aerogels	2.0	200	780	[3]
Carbon nanosheet @few-layer MoS ₂	2.0	520	676	[4]
Co ₉ S ₈ /MoS ₂ yolk –shell spheres	2.0	1200	300	[5]
Few-layer MoS ₂ / reduced graphene oxide hybrids	1.0	1100	966	[6]
Carbon nanotubes @Low-crystallinity MoS ₂	1.0	400	600	[7]
MoS ₂ -graphene composite films	1.0	400	980	[8]
Nitrogen-doped graphene/MoS ₂	1.0	100	820	[9]
Column-like MoS ₂ superstructure	1.0	500	650	[10]
Hierarchical porous carbon nanosheets@MoS ₂	1.0	300	732	[11]
Graphene sheets @MoS ₂ nanosheets	1.0	400	900	[12]
MoS ₂ hollow nanospheres	0.5	100	1100	[13]
3D radially oriented MoS ₂ nanospheres	0.5	500	1009.2	[14]
SWNT/MoS ₂ composites	0.5	50	1215	[15]
N-doped carbon nanoboxes@MoS ₂	0.4	200	952	[16]
Mesoporous carbon@MoS ₂	0.4	500	1023	[17]
Nitrogen-doped carbon@MoS ₂ microspheres	0.15	300	1050	[18]
Graphene/TiO ₂ @C/few-layer MoS ₂	0.1	100	802	[19]
Nitrogen-doped graphene/MoS ₂ composites	0.1	100	1169	[20]
MoS ₂ –C nanocomposite	0.1	100	970	[21]
S-doped graphene @MoS ₂	0.1	300	1546	[22]
MoS ₂ /SiO ₂ /graphene hybrids	0.1	100	1060	[23]
3D honeycomb-like structured MoS ₂	0.1	50	1025	[24]
Hollow fullerene-like MoS ₂ nanocages	0.1	100	1043.7	[25]
Interconnected carbon nanotube	0.1	100	1893	[26]

@layered MoS ₂ nanohybrid				
Core-shell carbon@MoS ₂ nanotube sponges	0.1	100	740	[27]
C ₃ N ₄ /N-RGO/MoS ₂ hybrids	0.1	100	855	[28]

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