

This version replaces the SI originally published on 24/10/2025, where there were formatting issues with the text in the Figure captions.

Supporting Information

Hierarchical Integration of MoS₂ Nanoflower /MnO₂ Nanorod/CNT Ternary Composite Electrode for High Capacitance and Long-Term Cyclic Stability

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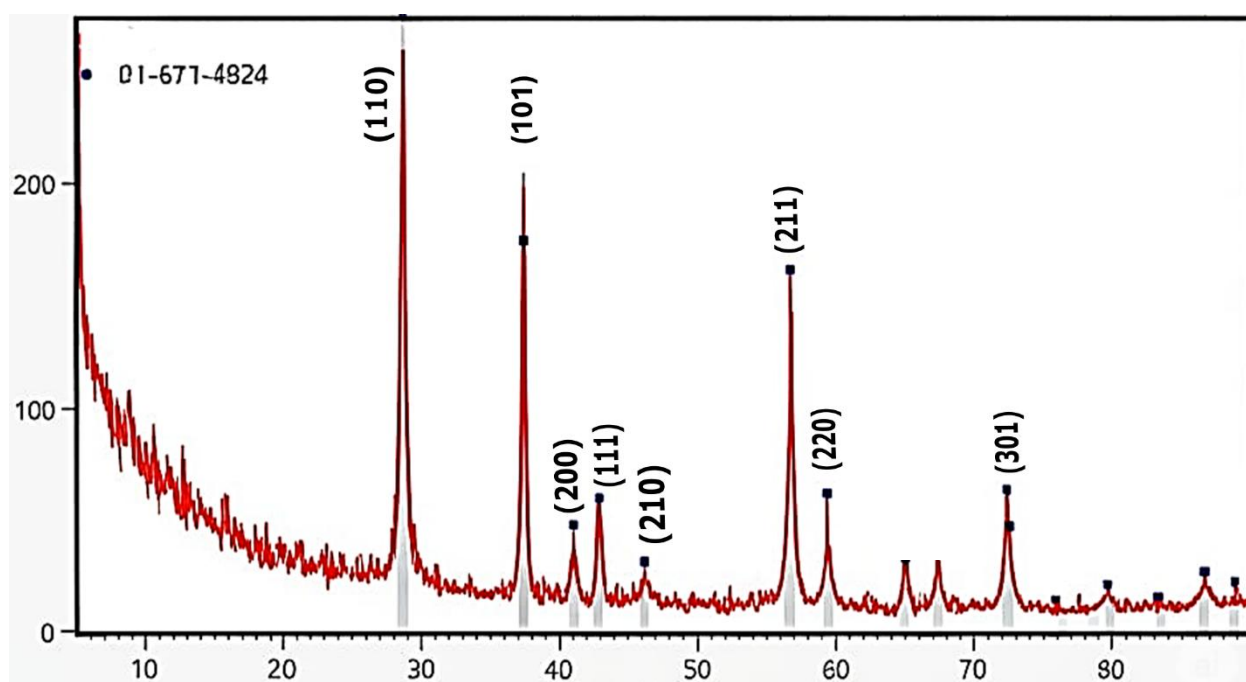
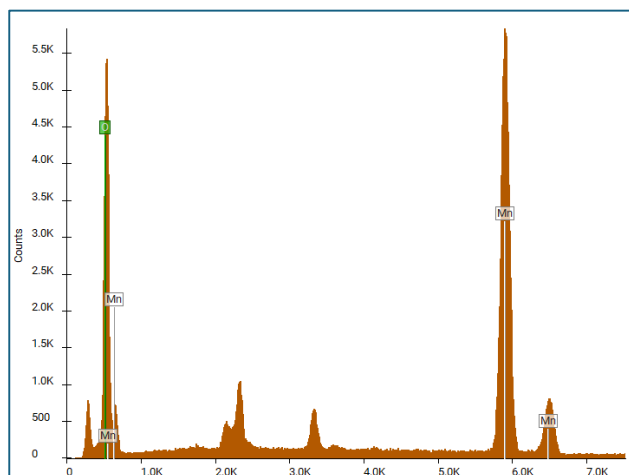
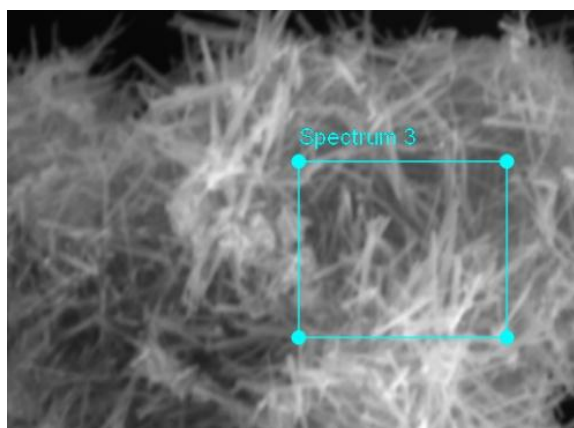


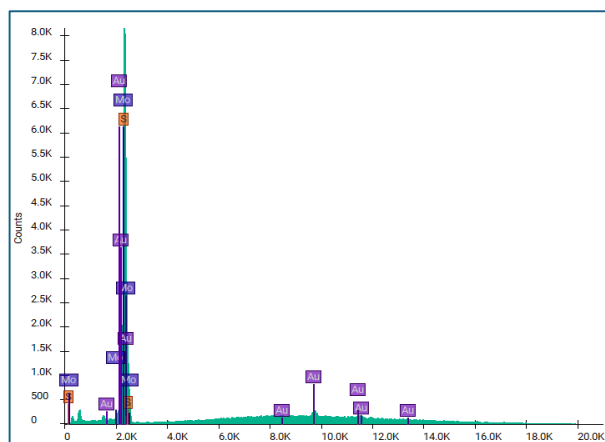
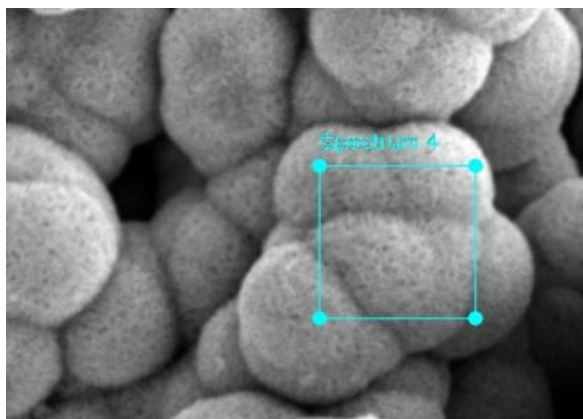
Fig. S1 XRD pattern of MnO₂ nanorods.

(a)



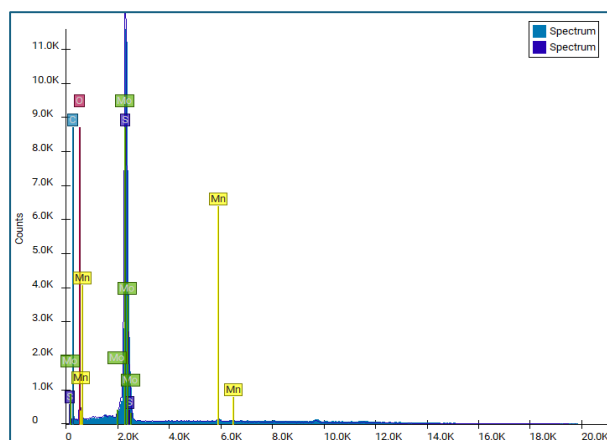
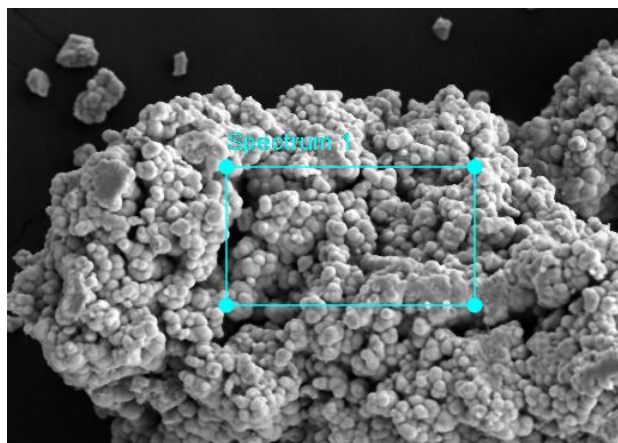
Element	Atomic %	Weight %
Manganese	53.3%	79.67%
Oxygen	46.7%	20.33%

(b)



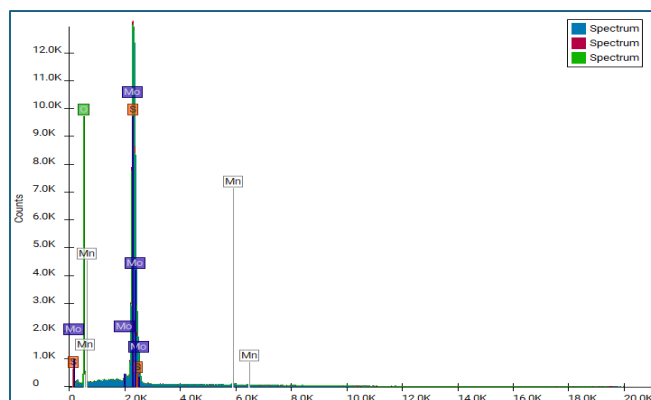
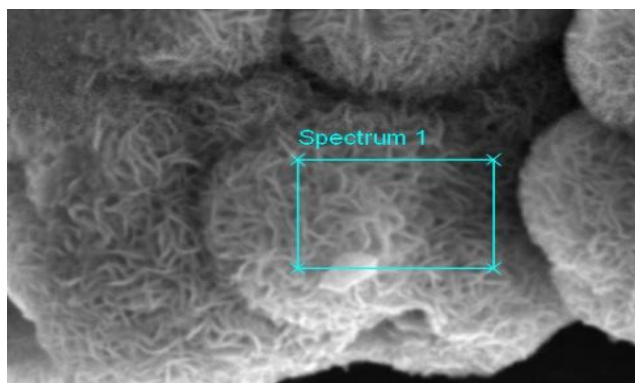
Element	Atomic %	Weight %
Sulphur	80.11%	57.38%
Molybdenum	19.89%	42.62%

(c)



Element	Atomic %	Weight %
Sulphur	49.48%	35.83%
Molybdenum	25%	54.18%
Oxygen	24.65%	8.91%
Manganese	0.87%	1.08%

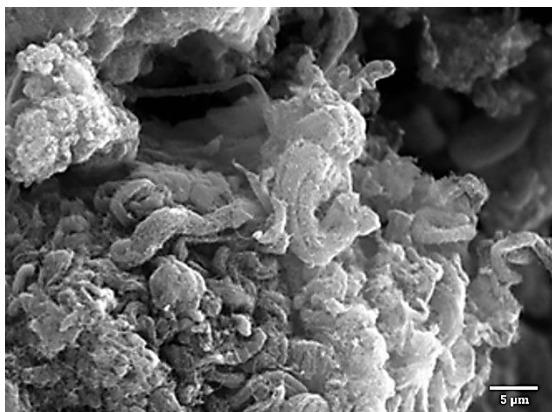
(d)



Element	Atomic %	Weight %
Carbon	53.59%	23.22%
Sulphur	25.78%	29.82%
Molybdenum	11.7%	40.49%
Oxygen	8.01%	4.62%
Manganese	0.93%	1.85%

Fig. S2 (a-d) EDX spectra of MnO₂ nanorods, MoS₂ nanoflower, MoS₂/MnO₂ (5 wt%) and MoS₂/MnO₂ (5 wt%)/CNT (1 wt%) nanocomposites, respectively.

(a)



(b)

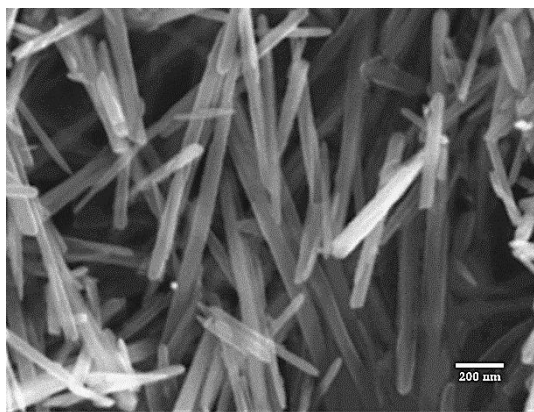


Fig. S3 (a) SEM images of CNT and (b) MnO₂ nanorods respectively.

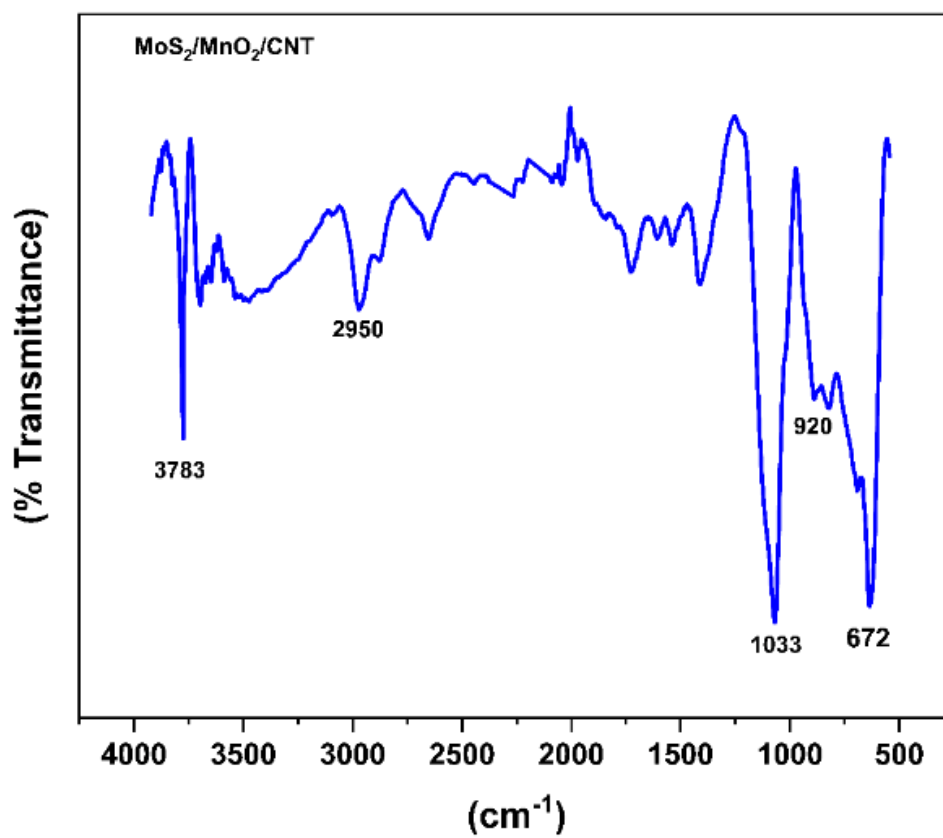


Fig. S4 FTIR spectra of MoS₂/MnO₂ (5 wt%)/CNT (1 wt%) nanocomposite.

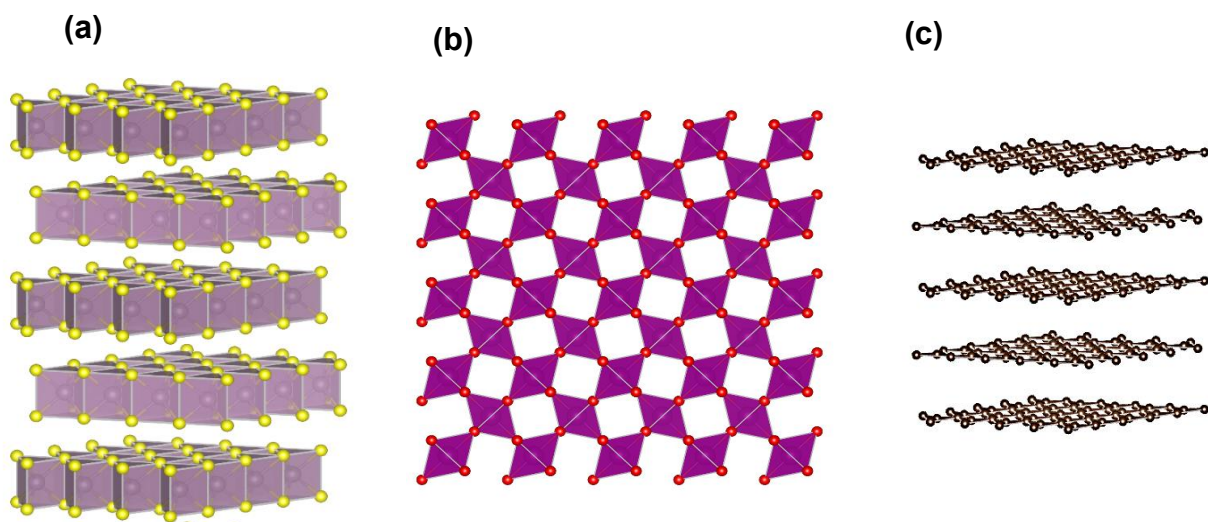


Fig. S5 Crystal structure of (a) layered 2H MoS₂, (b) β -MnO₂, and (c) CNT.

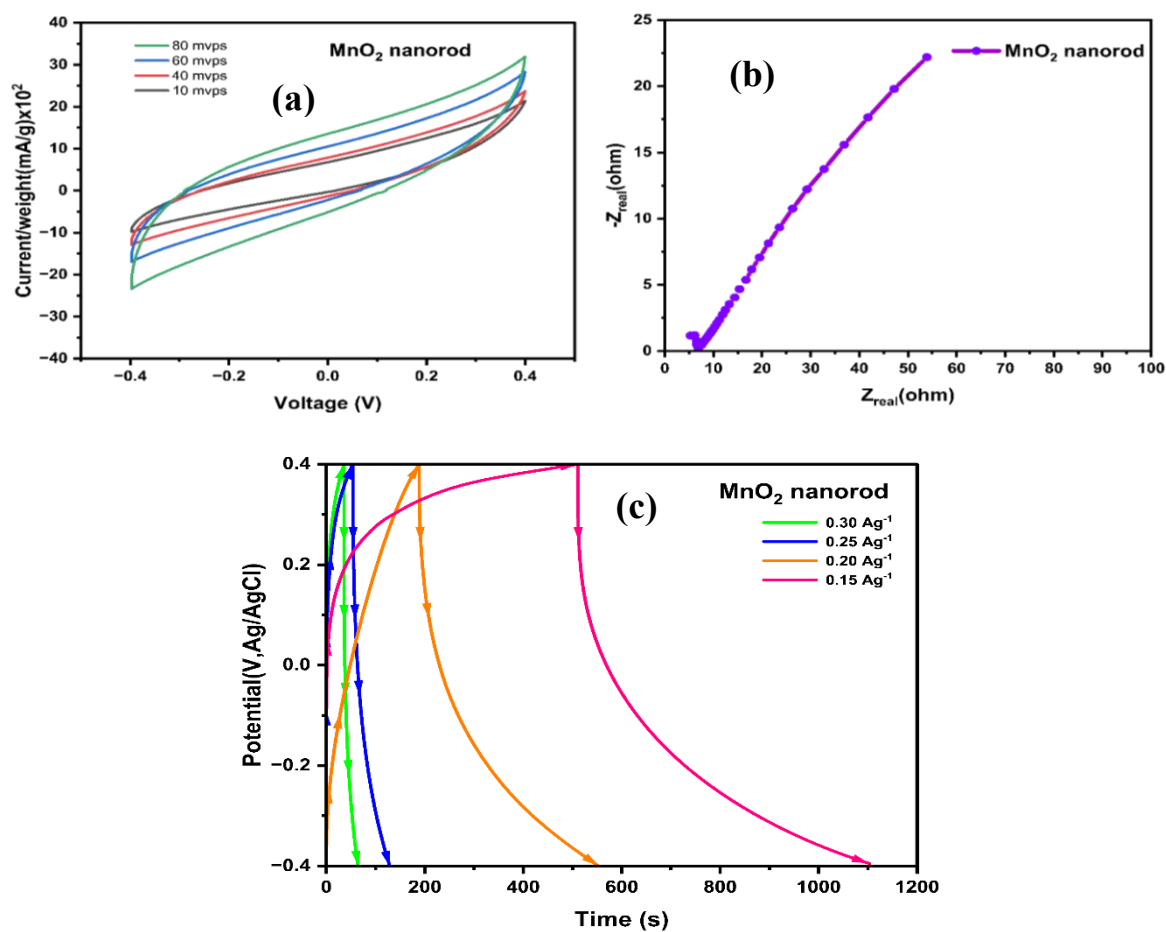


Fig. S6 (a) CV, (b) EIS, and (c) GCD plots of MnO_2 nanorods.

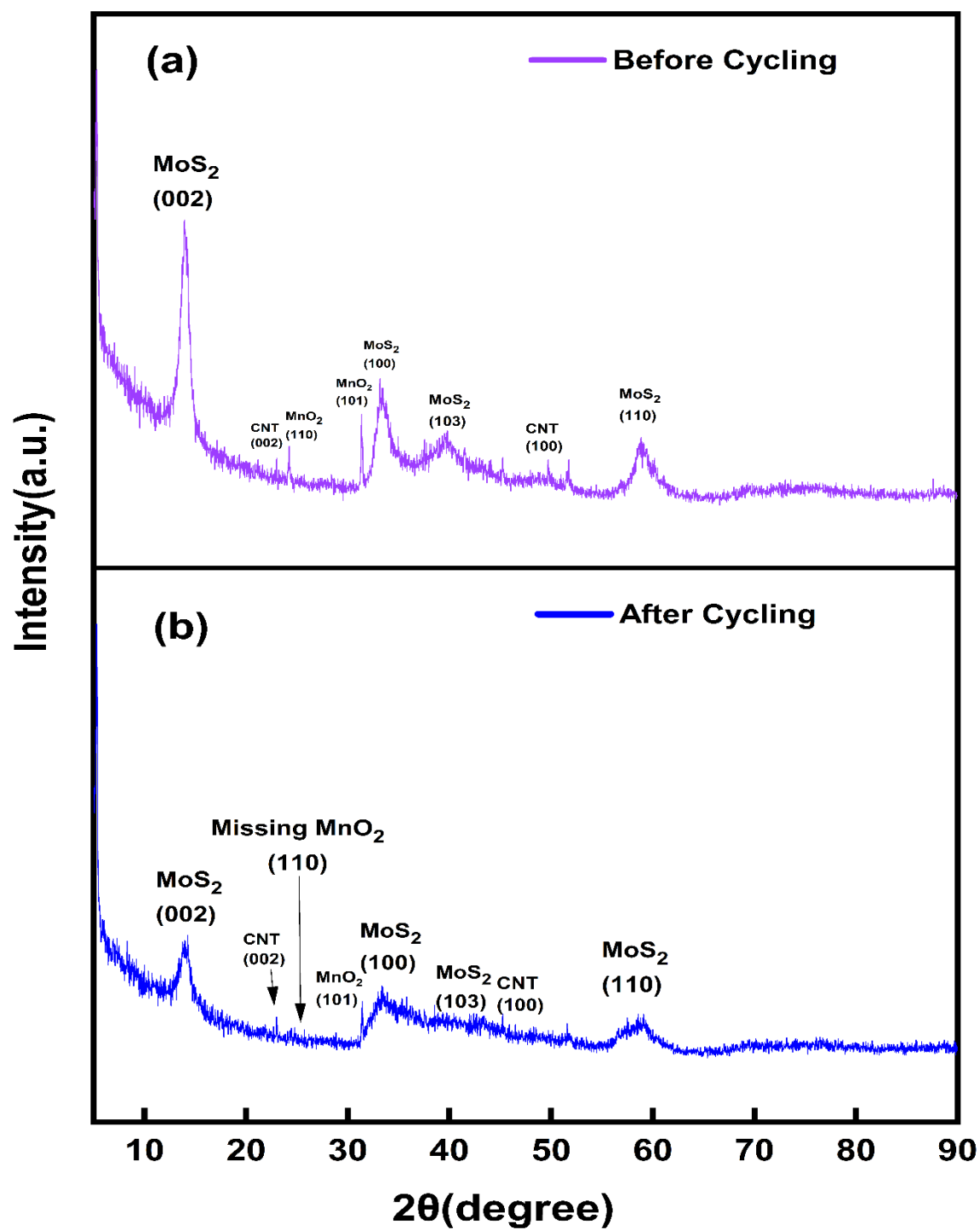
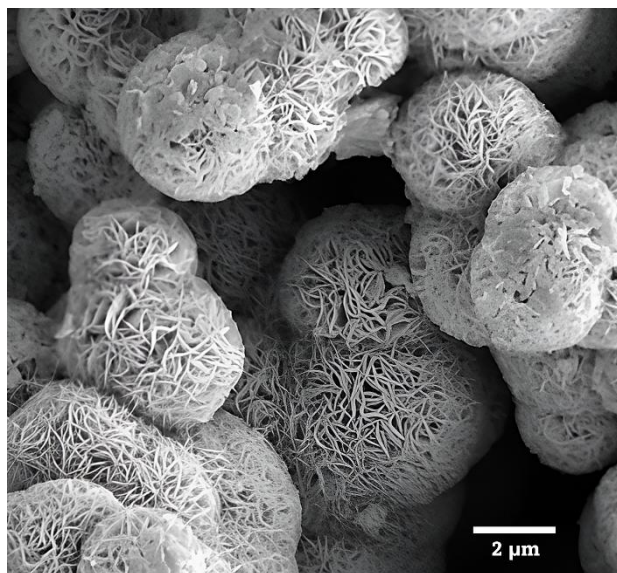


Fig. S7 XRD pattern of $\text{MoS}_2/\text{MnO}_2$ (5 wt%)/CNT (1 wt%) ternary composite (a) before cycling, (b) after cycling.

(a)



(b)

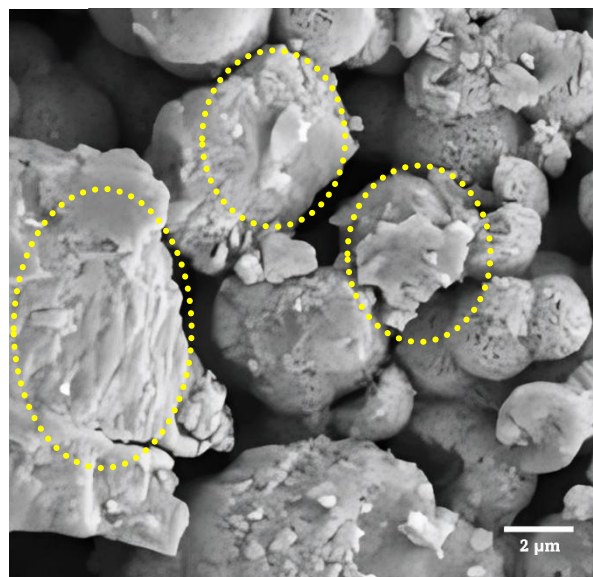


Fig. S8 SEM images of MoS₂/MnO₂ (5 wt%)/CNT (1 wt%) ternary composite (a) before cycling, (b) after cycling.

Table S1. XRD Analysis Data

Parameter / Feature	MoS ₂	MoS ₂ /MnO ₂ (3 wt %)	MoS ₂ /MnO ₂ (5 wt%)	MoS ₂ /MnO ₂ (5 wt %)/CNT (1 wt %)
XRD Instrument	Malvern PANalytical Empyrean	Malvern PANalytical Empyrean	Malvern PANalytical Empyrean	Malvern PANalytical Empyrean
Operating Conditions	Cu anode, 40 mA, 45 kV, RT	Cu anode, 40 mA, 45 kV, RT	Cu anode, 40 mA, 45 kV, RT	Cu anode, 40 mA, 45 kV, RT
Reference Phases	2H–MoS ₂ (P63/mmc)	2H–MoS ₂ + tetragonal β -MnO ₂	2H–MoS ₂ + tetragonal β -MnO ₂	2H–MoS ₂ + tetragonal β -MnO ₂ +CNT
JCPDS Card for Matching	No. 01-075-1539	No. 01-075-1539(MoS ₂) No. 01-071-4824 (MnO ₂)	No. 01-075-1539(MoS ₂) No. 01-071-4824 (MnO ₂)	No. 01-075-1539(MoS ₂) No. 01-071-4824 (MnO ₂) No. 00-058-1638 (CNT)
Degree of Crystallinity / Relative Intensity (%)	39.68	47.84	49.25	51.03
Defect Density Indicator (Relative)	25.60	28.92	30.67	32.93