

# **Supporting information**

## **Hierarchical Microtubes Constructed by MoS<sub>2</sub> Nanosheets with Enhanced Sodium Storage Performance**

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Shaoming Fang,<sup>\*,†</sup> Jian Liu,<sup>\*,§,¶</sup> and Yan Yu<sup>\*,‡,§</sup>*

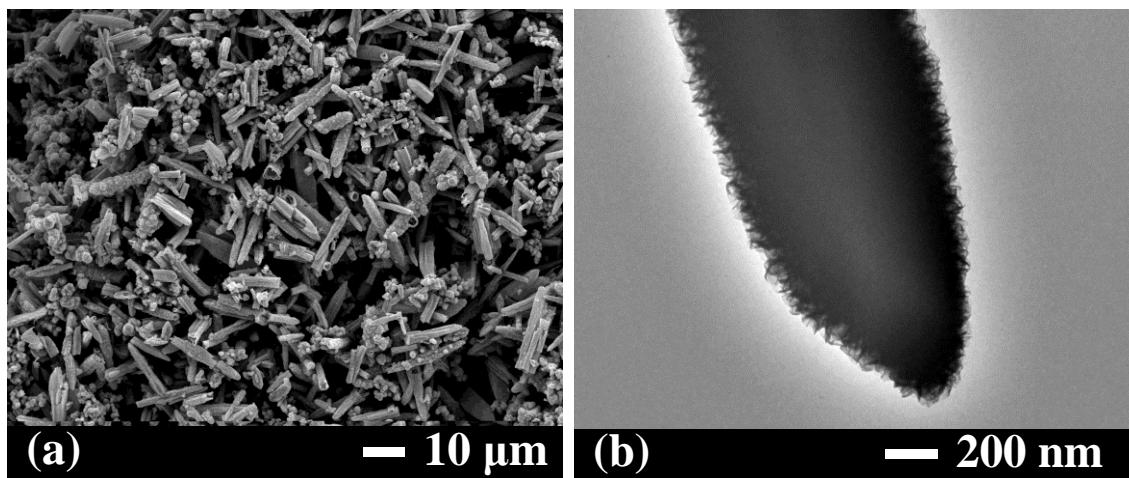
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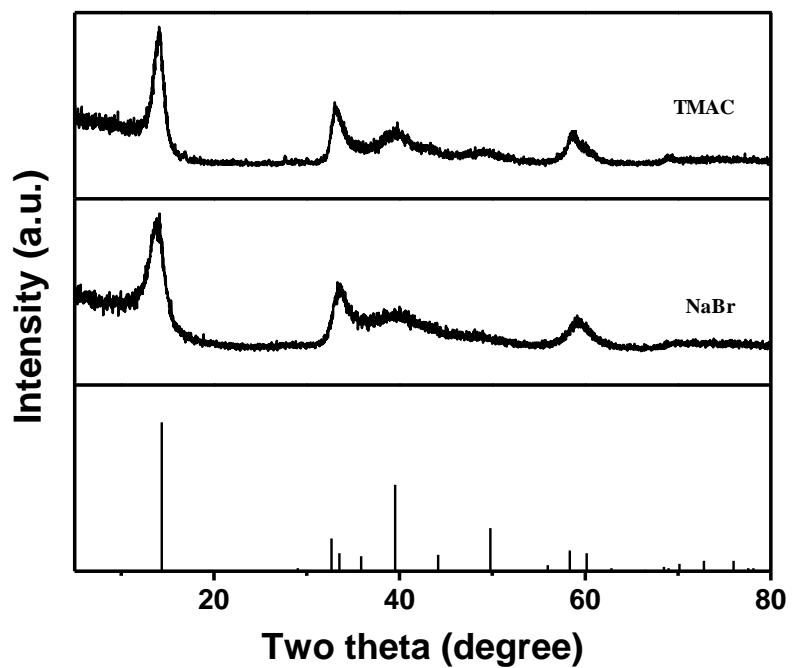
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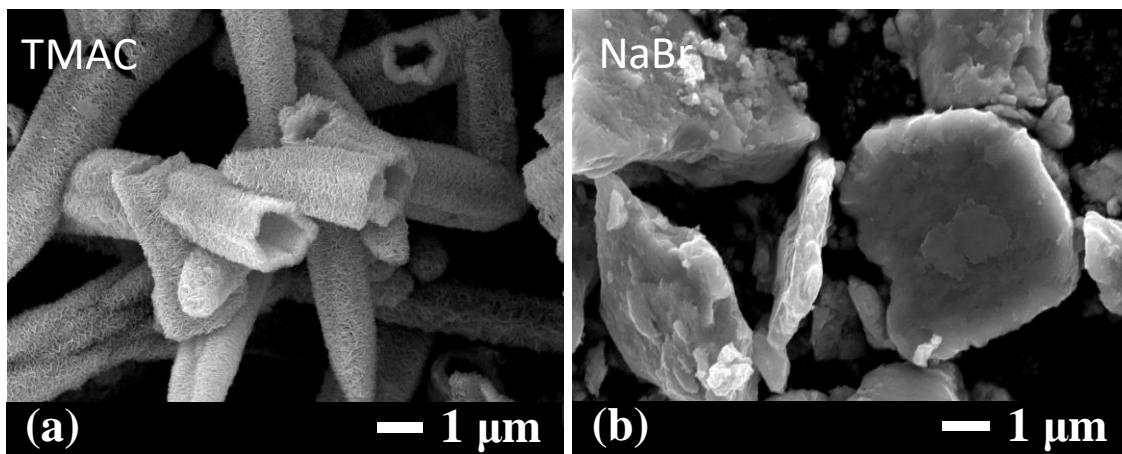
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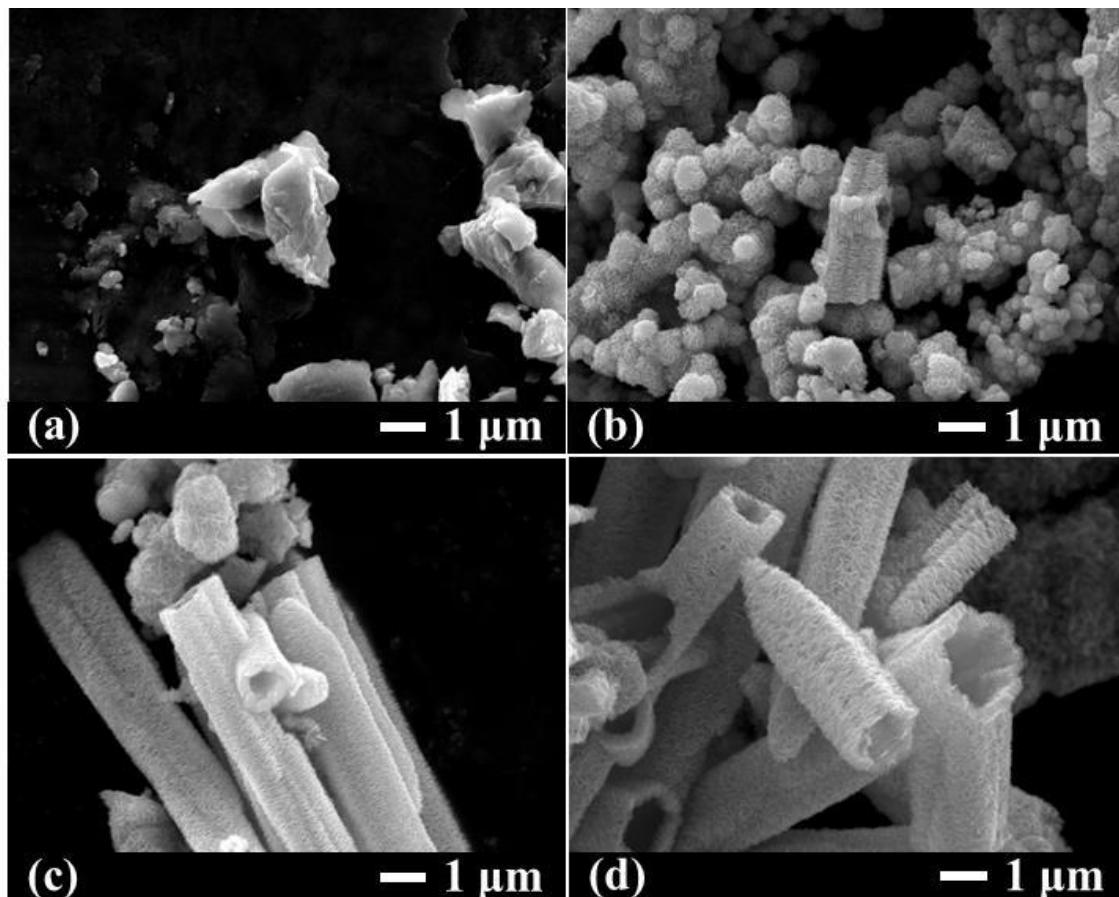
**Figure S1.** SEM (a) and TEM (b) images of synthesized tubular MoS<sub>2</sub> (MS-T)



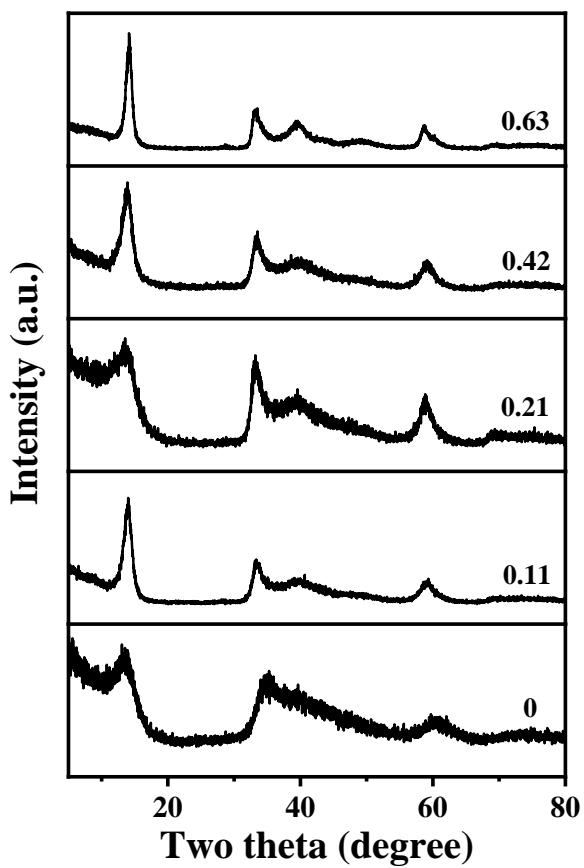
**Figure S2.** XRD patterns of MoS<sub>2</sub> synthesized with TMAC and NaBr as additives



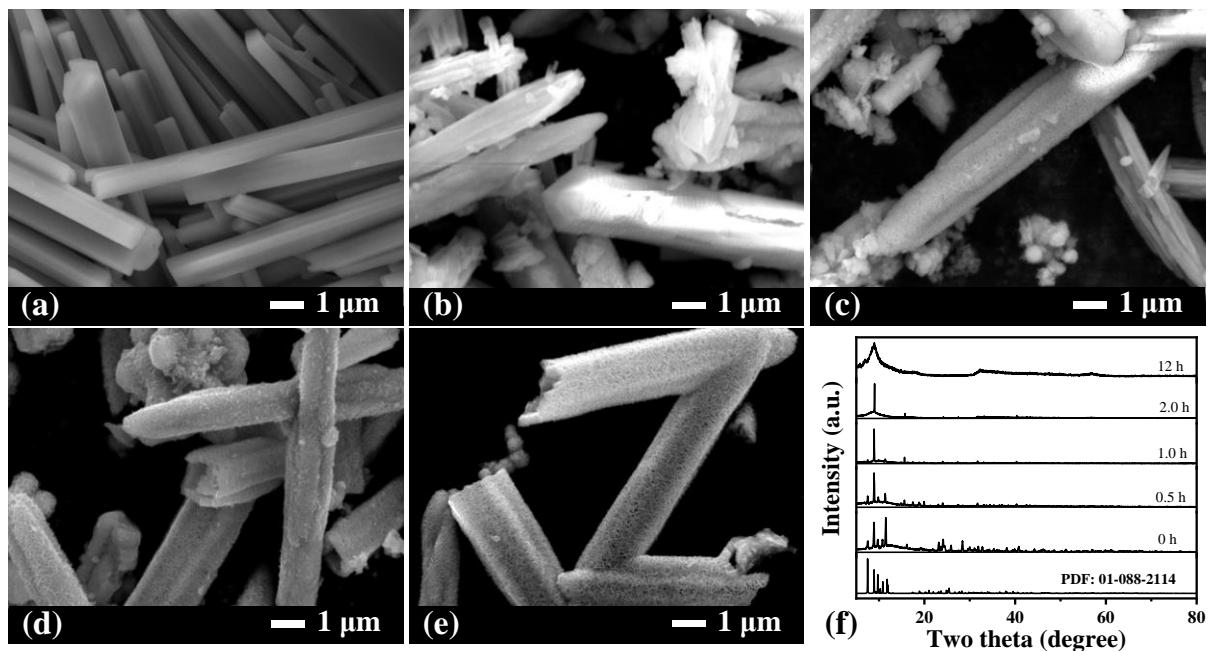
**Figure S3.** SEM images of MoS<sub>2</sub> synthesized with (a) TMAC and (b) NaBr as additives



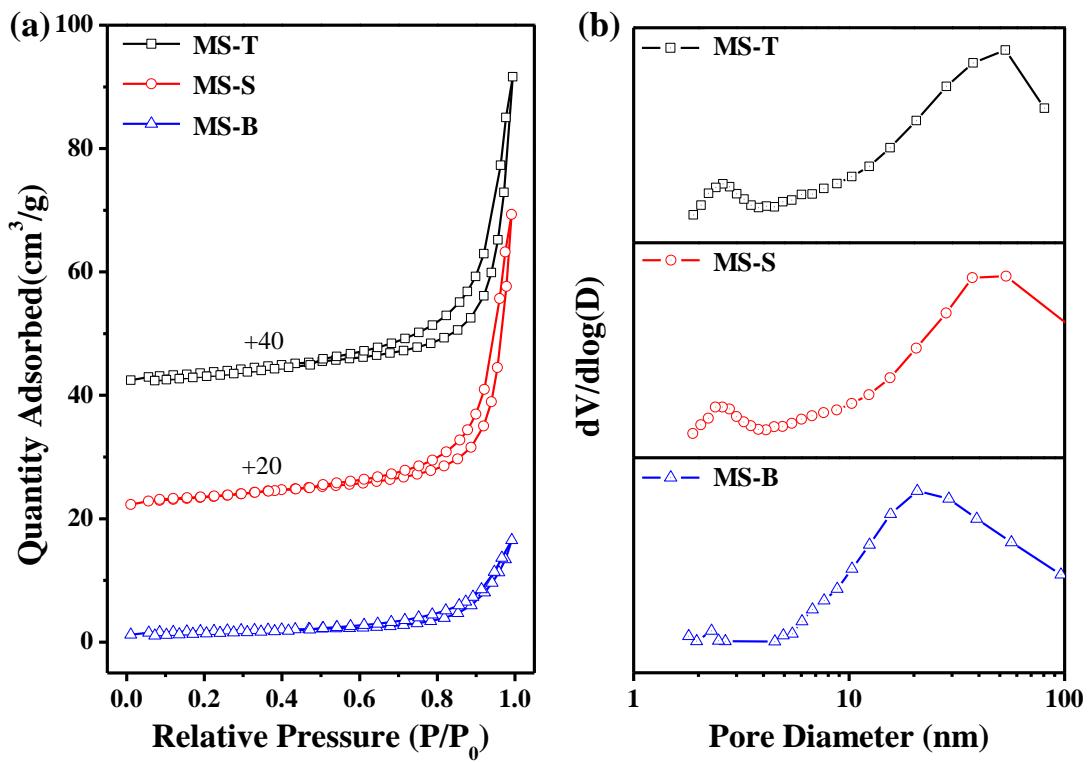
**Figure S4.** SEM images of synthesized MoS<sub>2</sub> with different TMAB concentration: (a) 0 mol/L, (b) 0.11 mol/L, (c) 0.21 mol/L and (d) 0.63 mol/L



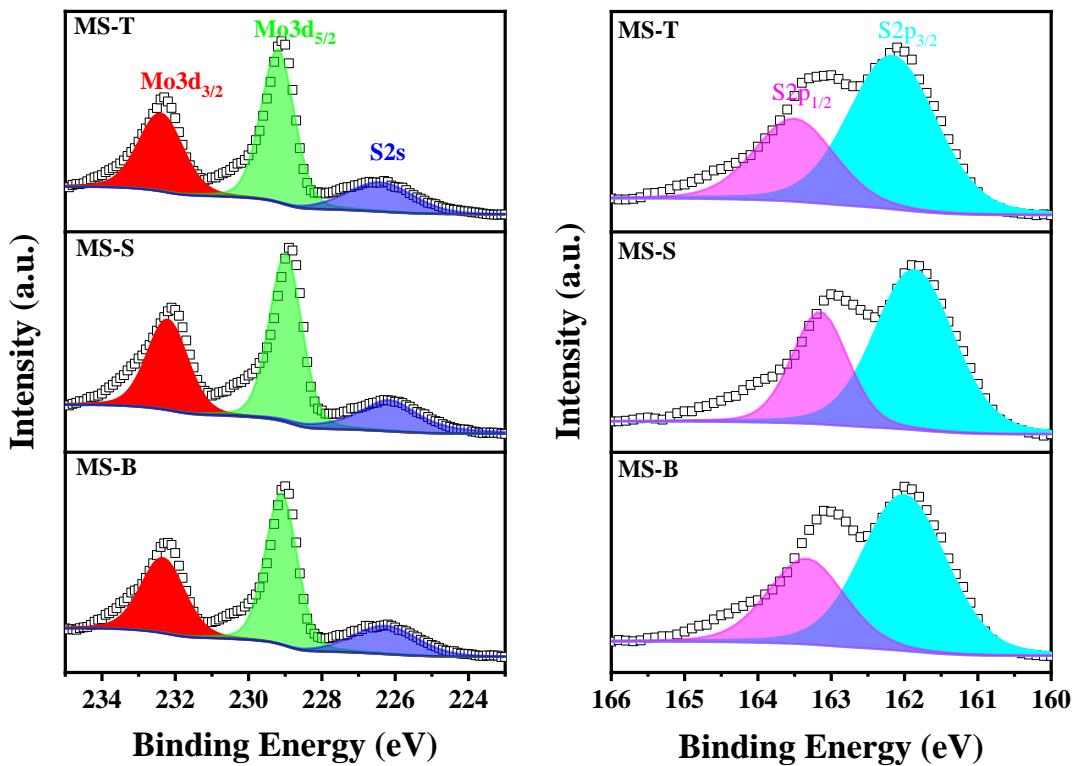
**Figure S5.** XRD patterns of synthesized MoS<sub>2</sub> with different TMAB concentration: 0 mol/L, 0.11 mol/L, 0.21 mol/L, 0.42 mol/L and 0.63 mol/L



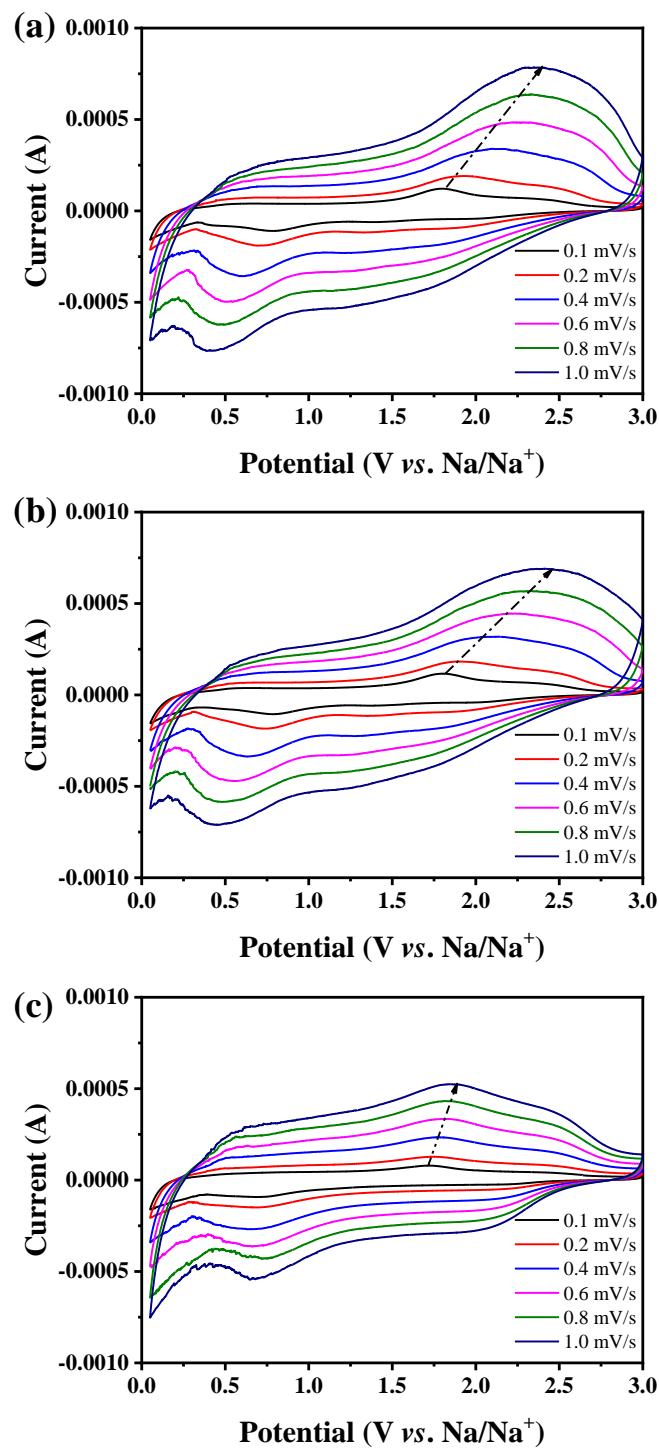
**Figure S6.** SEM images (a,b,c,d,e) and XRD patterns (f) of synthesized MoS<sub>2</sub> precursor with different hydrothermal treatment time: 0 h (a), 0.5 h (b), 1 h (c), 2 h (d), 12 h (e).



**Figure S7.** a) Nitrogen sorption isotherms and b) the pore size distribution curves of MS-T, MS-S and MS-B



**Figure S8.** XPS spectra of MS-T, MS-S and MS-B



**Figure S9.** Cyclic voltammograms at various scanning rates for (a) MS-T, (b) MS-S and (c) MS-B

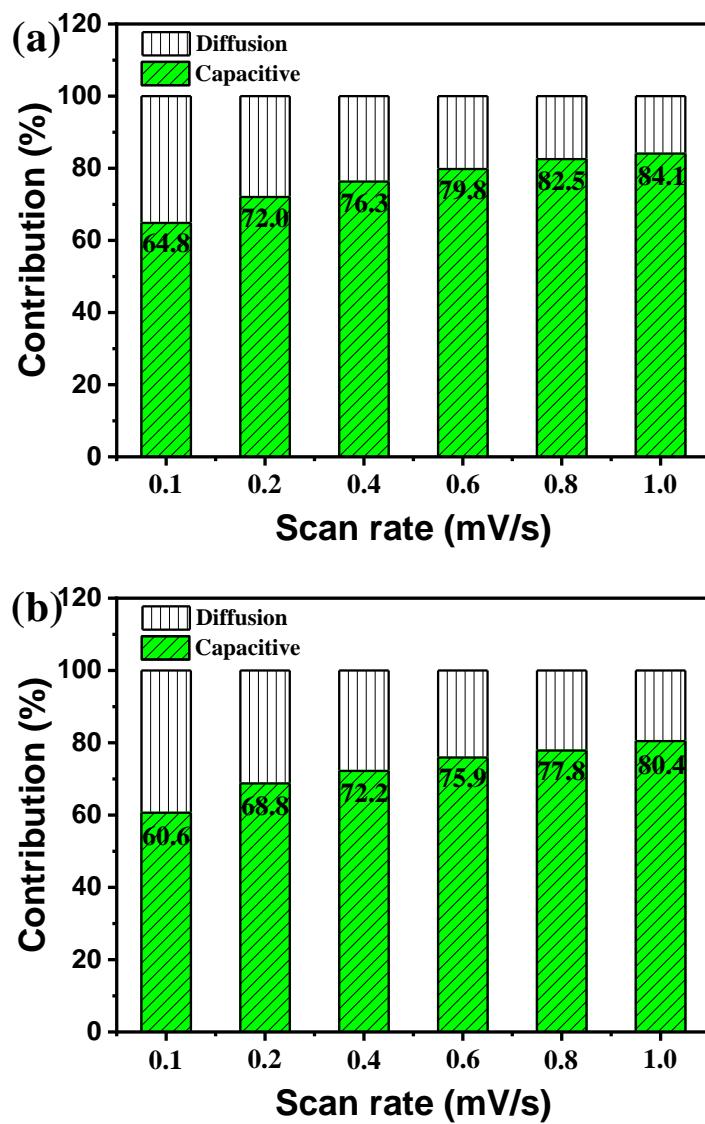
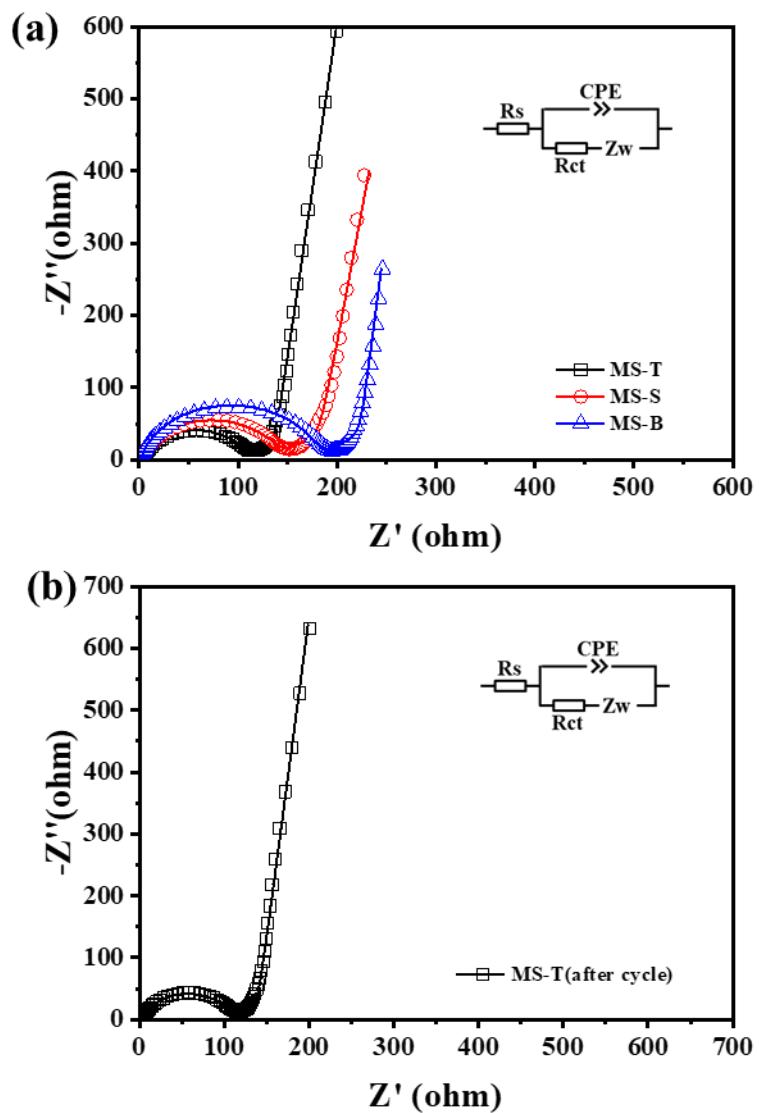
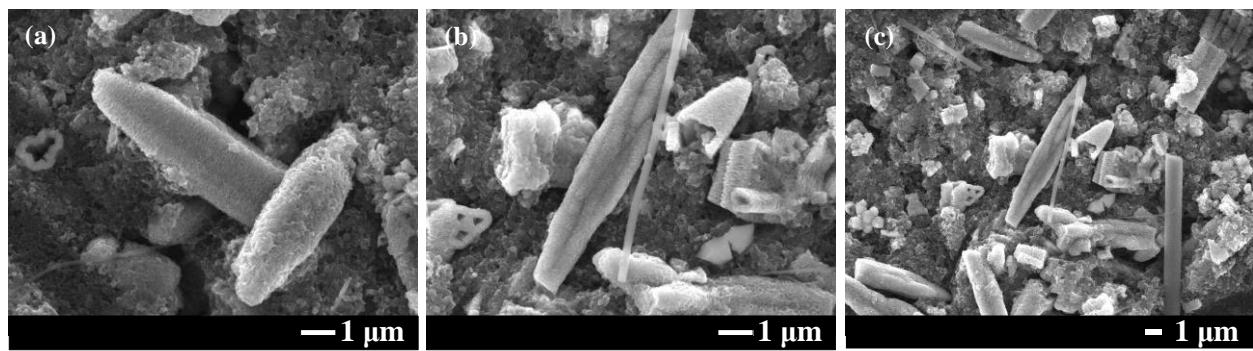


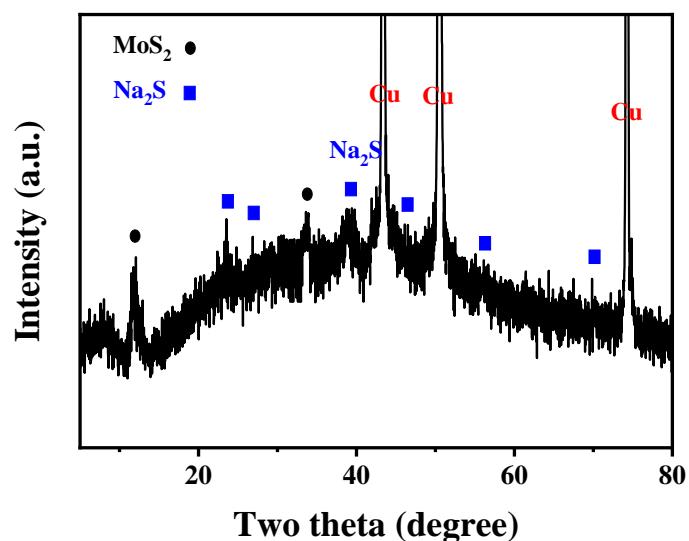
Figure S10. Contribution ratio of capacitive capacity at various scanning rates for (a) MS-S and (b) MS-B



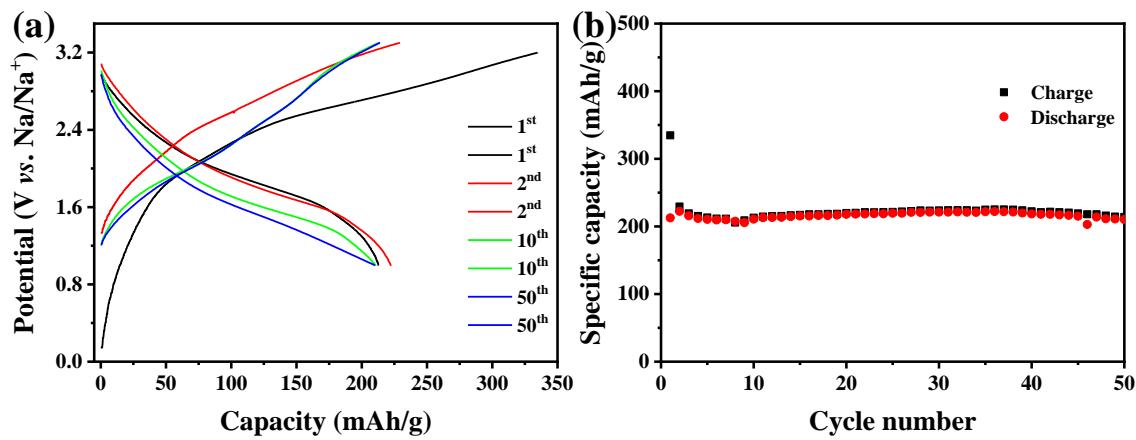
**Figure S11.** (a) Nyquist plots of electrodes MS-T, MS-S and MS-B before cycle and (b) Nyquist plot of electrode MS-T after cycle



**Figure S12.** SEM images of MS-T after (a) 50 and (b,c) 100 cycles



**Figure S13.** XRD pattern of MS-T after complete discharge



**Figure S14.** (a) Discharge/charge curves and (b) cyclic performance of the MS-T//Na<sub>3</sub>V<sub>2</sub>(PO<sub>4</sub>)<sub>3</sub> full cell tested at 1000 mA/g

**Table S1.** Sodium ion batteries performances for MoS<sub>2</sub> materials

Materials	Morphologies	First discharge		Cycling performance		Rate performance		Ref.
		Capacity (mAh/g)	Current	Capacity (mAh/g)/cycles	Current	Capacity (mAh/g)	Current	
MoS <sub>2</sub>	wrinkled nanosheet	310	0.1C	125/30	0.1C	120	1C	S1
MoS <sub>2</sub>	hollow spheres	440	0.1 A/g	472.7/100	0.1 A/g	308	2 A/g	S2
MoS <sub>2</sub>	bundle	630	0.1 A/g	354/100	0.5 A/g	262	5 A/g	S3
MoS <sub>2</sub>	exfoliated nanosheets	1045	0.1 A/g	385/100	0.1 A/g	281	1 A/g	S4
MoS <sub>2</sub>	nanoflowers	243	0.2 A/g	295/300	0.2 A/g	175	10 A/g	S5
MoS <sub>2</sub>	worm-like	675.3	0.0617	410.5/80	0.0617	~100	0.617	S6
			A/g		A/g		A/g	
MoS <sub>2</sub>	microflowers	1065	0.067	595/50	0.067	240	6.7 A/g	S7
			A/g					
MoS <sub>2</sub>	tubes	<b>1674.8</b>	<b>0.1 A/g</b>	<b>505.7/100</b>	<b>1 A/g</b>	<b>537.0</b>	<b>1 A/g</b>	<b>This work</b>
						<b>365.5</b>	<b>5 A/g</b>	
						<b>270.2</b>	<b>10 A/g</b>	

**Table S2.** Parameters obtained by fitting the EIS data to the equivalent circuit model

Sample	R <sub>s</sub> [Ohm]	R <sub>ct</sub> [Ohm]	Z <sub>w</sub> [Ohm]
MS-T	3.84	101.3	90.2
MS-T (after 100 cycles)	3.85	102.5	94.6
MS-S	1.75	137.5	119.3
MS-B	1.72	179.1	119.6

## References

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