Supplementary Information

Supercapacitive Energy Storage Performance of Molybdenum Disulfide Nanosheets Wrapped with Microporous Carbons

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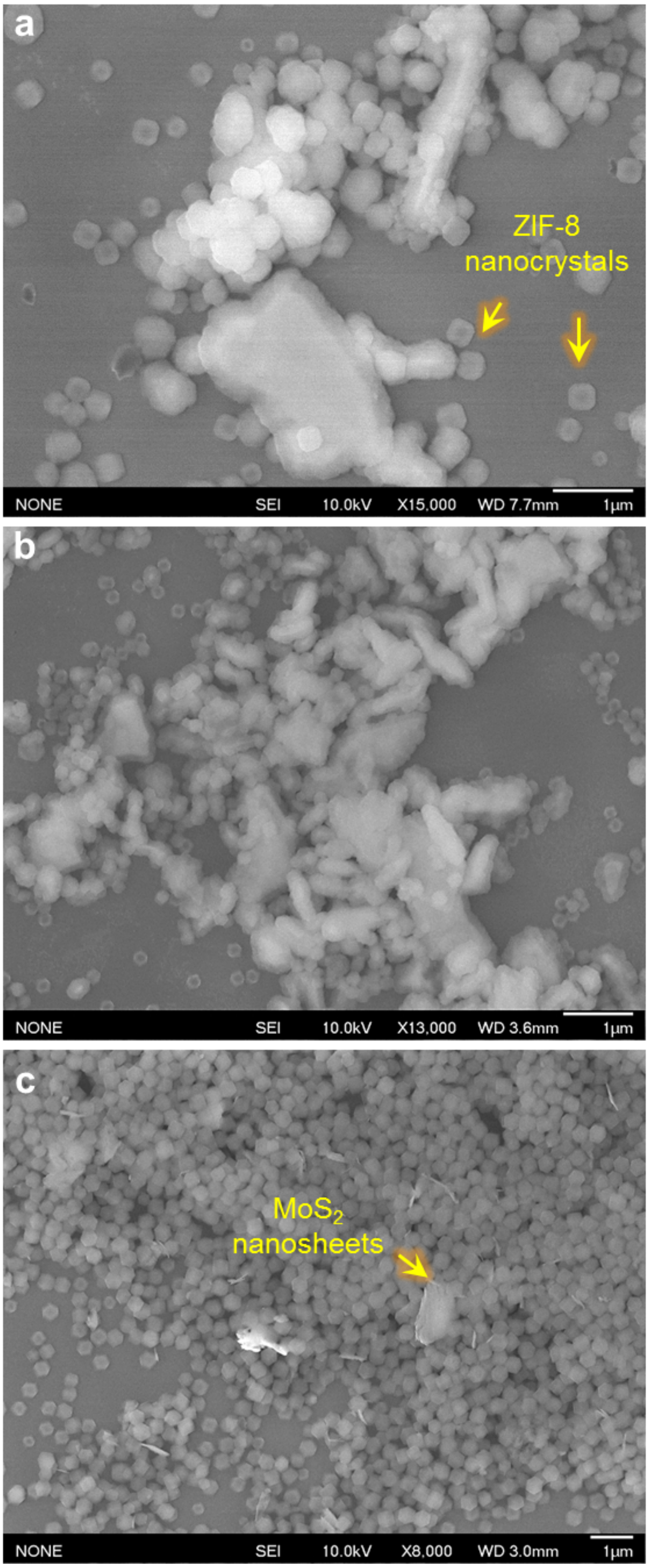

Fig. S1 SEM images of the products prepared at the mass ratios of MoS_2:Zn(Ac)$_2$·2H_2O:MeIM = 0.18:10:30 (a) and 0.36:10:30 (b) in a 1:4 (v/v) H_2O/ethanol solution, and 0.9:10:30 in a H_2O solution (c).

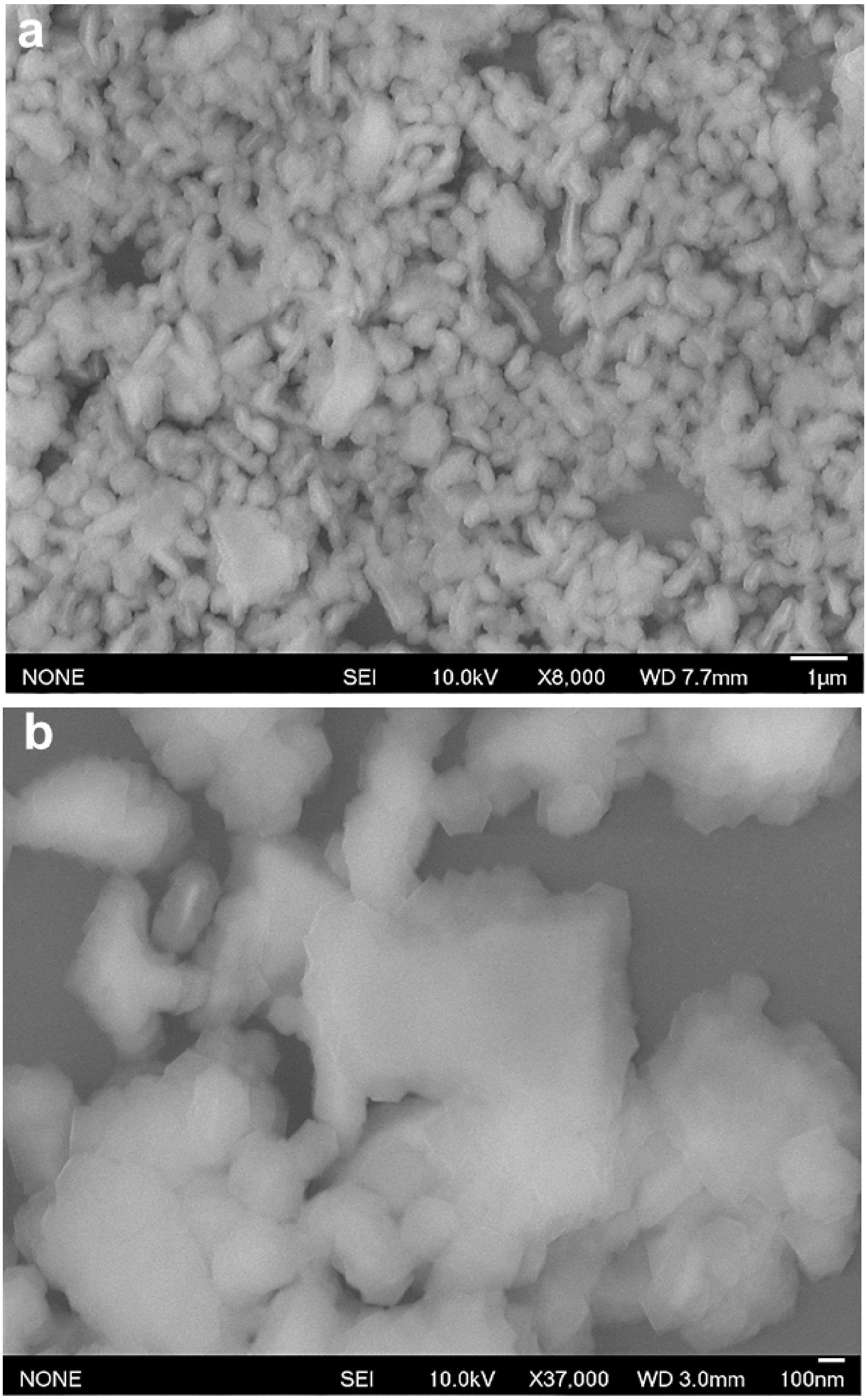

Fig. S2 Low- (a) and high-magnification (b) SEM images of the MoS_2@ZIF-8 sample prepared at the optimized condition (mass ratio for MoS_2, $Zn(Ac)_2 \cdot 2H_2O$ is 0.9:10:30 in a 1:4 (v/v) H_2O/ethanol solution).

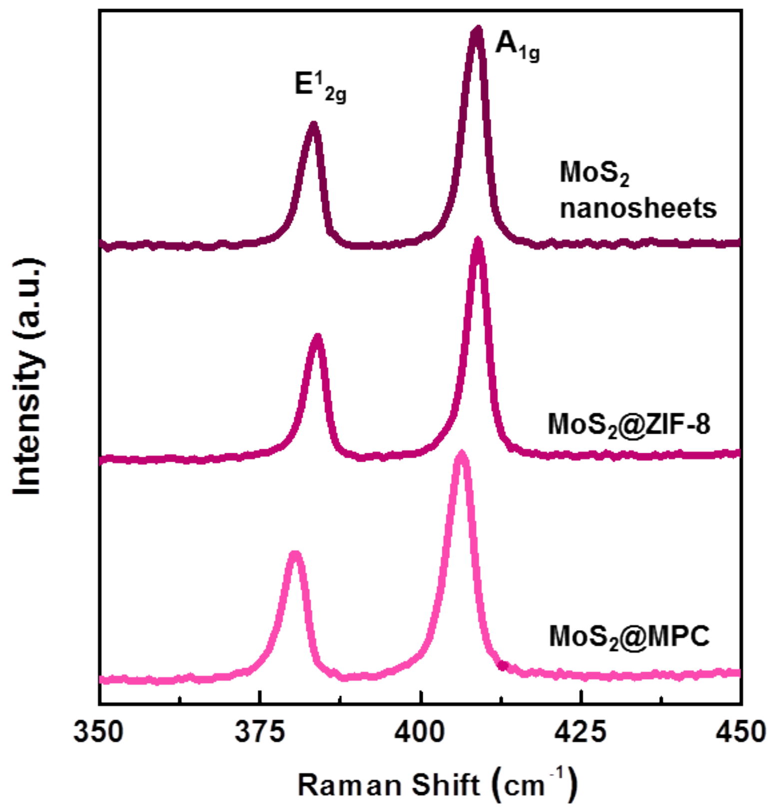

Fig. S3 Raman spectra of MoS_2 nanosheets, MoS_2@ZIF-8 and MoS_2@MPC.

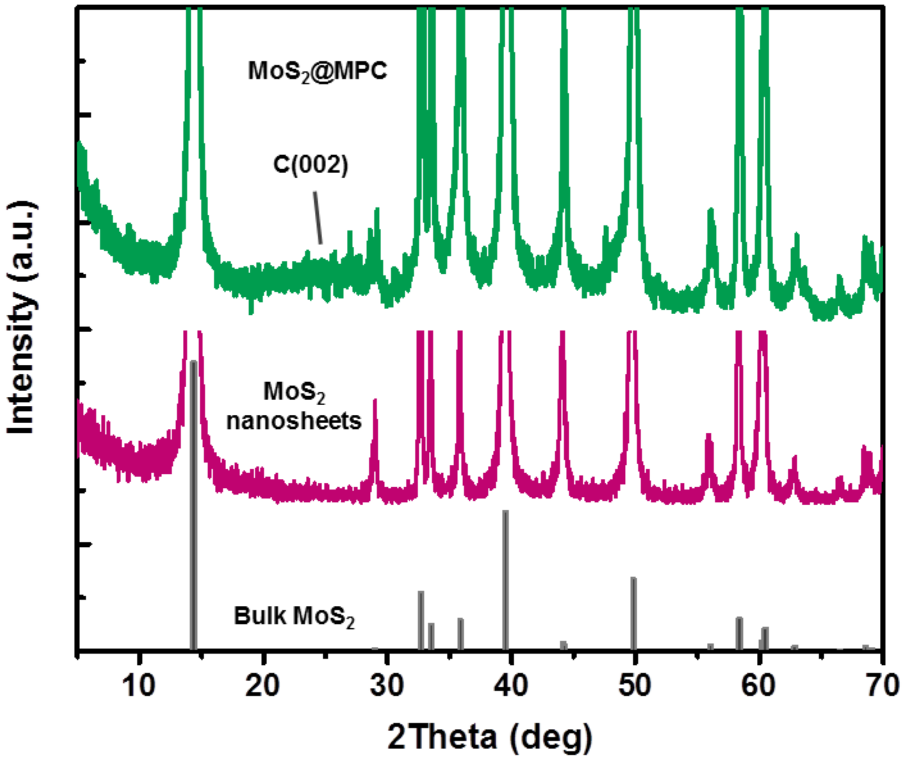

Fig. S4 Enlarged XRD patterns of MoS_2@MPC and MoS_2 nanosheets. Standard bulk MoS_2 (JCPDS 651951) diffraction pattern is also added. The C(002) diffraction pattern arisen from MPC shells is also revealed.

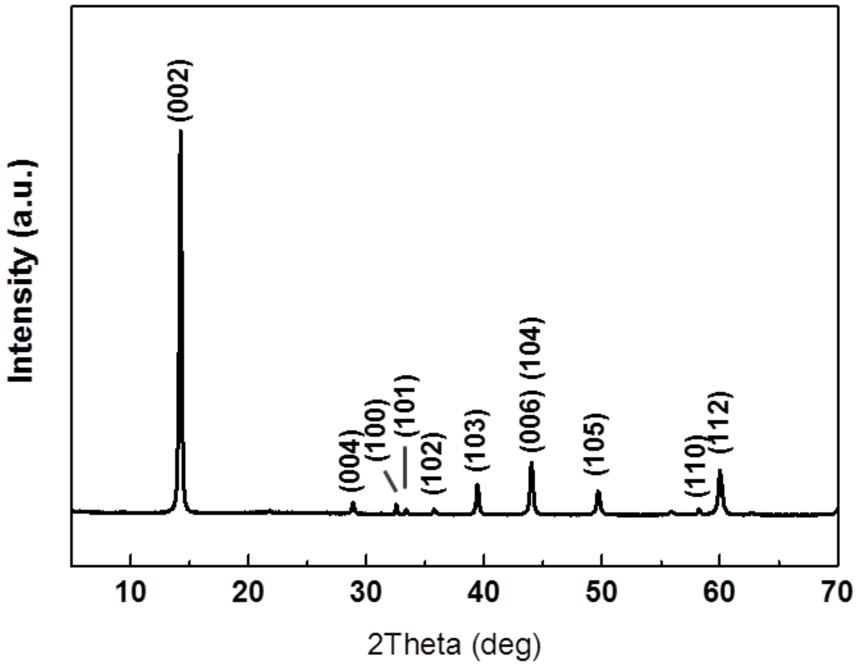

Fig. S4 XRD pattern of MoS_2 nanosheet sample after treatment at 900 ^{o}C in Ar for 2 h. The change of the relative intensity of diffraction patterns may be caused by the different XRD experimental conditions. The sample was dispersed in ethanol firstly and then dropped on XRD glass substrate. After vacuum drying, the sample was used for XRD data collection. In this process, a self-assembly-caused preferred orientation of MoS_2 facets may take place. This leads to a different relative diffraction intensity compared with the standard powder method.

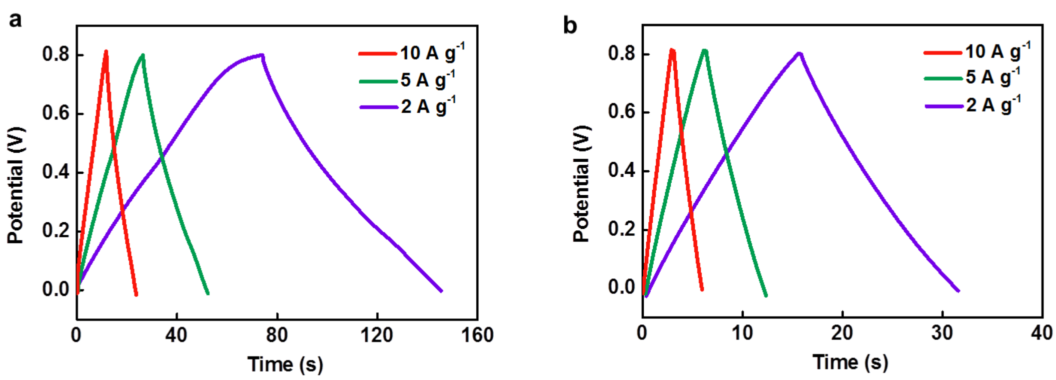

Fig. S5 Charge–discharge curves of MOS_2@MPC (a) and a mixture of MoS_2 and MPC (m:m = 3:2) (b) at different current densities.

Table S1 Comparison of the properties of different MoS_2 and MoS_2-C materials for supercapacitor.

Electrode material	Electrolyte	Maximum specific capacitance	Rate performance	Final capacitance compared to the initial capacitance	Ref.
MoS_2 nanowall films	0.5 M H_2SO_4	100 F g^{-1} at 1 mV S^{-1}	--	--	9
MoS_2 nanosheets	1.0 M Na_2SO_4	129.2 F g^{-1} at 1 A g^{-1}	57.1 %, 10 A g^{-1}	85.1 % (after 500 cycles at 1 A g^{-1})	S1
Sphere-like MoS_2 nanostructrues	1.0 M Na_2SO_4	92.85 F g^{-1} at 0.5 mA cm^{-2}	--	93.8 % (after 1000 cycles at 0.5 mA cm^{-2})	11
Porous tubular C/MoS_2 nanocomposites	3.0 M KOH	210 F g^{-1} at 1 A g^{-1}	~36 %, 4 A g^{-1}	105 % (after 1000 cycles at 4 A g^{-1})	S2
MoS_2/CNTs composites	1.0 M Na_2SO_4	452.7 F g^{-1} at 1 A g^{-1}	73.7%, 10 A g^{-1}	95.8 % (after 1000 cycles at 1 A g^{-1})	12
Low Concentration MoS_2/RGO	1.0 M $HClO_4$	128 F g^{-1} at 10 mV s^{-1}	~72 %, 80 mV s^{-1}	92 % (after 1000 cycles at 20 mV s^{-1})	10
Medium Concentration MoS_2/RGO		265 F g^{-1} at 10 mV s^{-1}	~96 %, 80 mV s^{-1}	70 % (after 1000 cycles at 20 mV s^{-1})	
High Concentration MoS_2/RGO		148 F g^{-1} at 10 mV s^{-1}	~71 %, 80 mV s^{-1}	--	
MoS_2@MPC	1.0 M H_2SO_4	189 F g^{-1} at 1 A g^{-1}	70.5 %, 20 A g^{-1}	98 % (after 3000 cycles at 10 A g^{-1})	This work

References

S1. K. J. Huang, J. Z. Zhang, G. W. Shi, Y. M. Liu, *Electrochim. Acta*, 2014, **132**, 397.

S2. B. L. Hu, X. Y. Qin, A. M. Asiri, K. A. Alamry, A. O. Al-Youbi, X. P. Sun, *Electrochim. Acta*, 2013, **100**, 24.