Supporting Information

Oxygen Incorporated and Polyaniline Intercalated 1T/2H Hybrid MoS_2 Nanosheets Arrayed on Reduced Graphene Oxide for High Performance Supercapacitors

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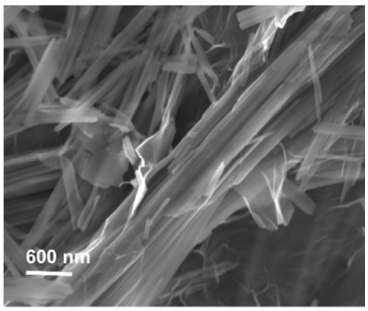

Figure S1. The SEM image of $Mo_3O_{10}(C_6H_5NH_3)_2 \cdot 4H_2O$/GO precursor.

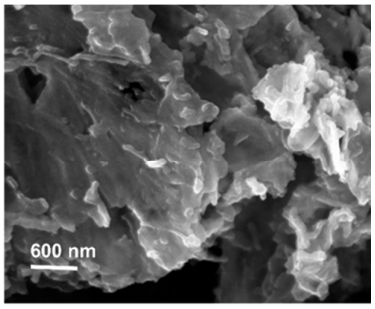

Figure S2. The SEM image of MoO_x/PANI/GO.

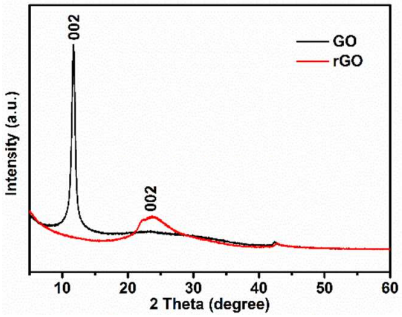

Figure S3 XRD patterns of GO and rGO which reduced in the hydrothermal reaction at 160 ^{o}C.

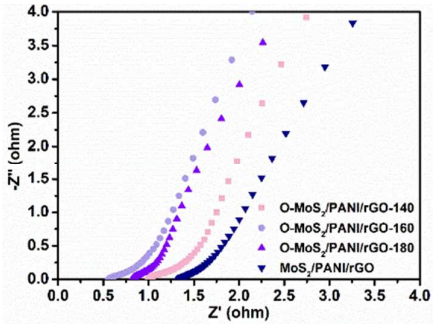

Figure S4. Nyquist plots of the O-MoS_2/PANI/rGO-140 HNSs, O-MoS_2/PANI/rGO-160 HNSs, O-MoS_2/PANI/rGO-180 HNSs and MoS_2/PANI/rGO HNSs tested in three-electrode configuration.

The Nyquist plot consists of a semicircle in the high frequency and an inclined line in the low frequency. The intercept at real part of the axis represent the equivalent series resistance (ESR) which is contributed by discontinuity of charge transfer at the solid/liquid interface, the intrinsic resistance of the electrode, contact resistance between the current collector and active materials and resistance induced by the faradaic process. The semicircle represents the charge transfer resistance and the inclined line is related to the ion transfer in the solid electrode. The ESR value of O-MoS_2/PANI/rGO-160 HNSs (0.55 Ω) is lower than that of O-MoS_2/PANI/rGO-140 HNSs (0.99 Ω), O-MoS_2/PANI/rGO-180 HNSs (0.81 Ω) and MoS_2/PANI/rGO HNSs (1.32 Ω). No obvious semicircles can be observed in the Nyquist plots, which is due to the low internal resistance. The inclined lines in the low frequency for the O-MoS_2/PANI/rGO-160 HNSs are more vertical than that for the O-MoS_2/PANI/rGO-140 HNSs, O-MoS_2/PANI/rGO-180 HNSs and MoS_2/PANI/rGO

HNSs indicating faster diffusion of H^+ in the electrode. Therefore, the comparisons of the Nyquist plots demonstrate the electron and ion transfer is enhanced in the O-MoS_2/PANI/rGO-160 HNSs.

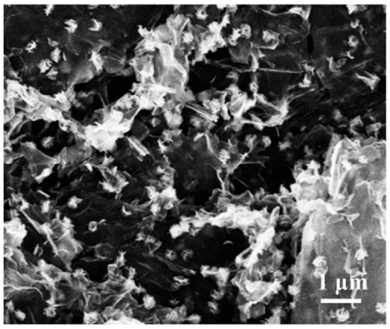

Figure S5 SEM image of O-MoS_2/PANI/rGO-160 HNSs after 50000 cycles

Table S1. Comparison of supercapacitive performance of recently reported MoS_2-based materials.

Electrode materials	Specific capacitance*	Cycle performance	Test system	Ref.
$MoS_{2-x}O_x$-39h	246 F g^{-1} at 0.5 A g^{-1} in 0.5M H_2SO_4	60.1% after 20,000 cycles at 4 A g^{-1}	three-electrode	[1]
O-MoS_2 microphores	744.2 F g^{-1} at 1 A g^{-1} in 1M KCl	77.8% after 10,000 cycles at 5 A g^{-1}	three-electrode	[2]
2D Tubular MoS_2/Ppy	462 F g^{-1} at 1 A g^{-1} in 0.5M Na_2SO_4	82% after 2,000 cycles at 3 A g^{-1}	three-electrode	[3]
1T/2H MoS_2	346F g^{-1} at 1 A g^{-1} in 2M KOH	95.4% after 2,000 cycles	three-electrode	[4]
MoS_2/C aerogels	712.6 F g^{-1} at 1 A g^{-1} in 6M KOH	97.3% after 13,000 cycles	three-electrode	[5]
This work	752.0 F g^{-1} at 1 A g^{-1} in 1M H_2SO_4	80.4% after 50,000 cycles at 50 A g^{-1}	Three-electrode	

References

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(5) Zhang, Y.; He, T.; Liu, G.; Zu, L.; Yang J. One-pot mass preparation of MoS_2/C aerogels for high-performance supercapacitors and lithium-ion batteries. *Nanoscale* **2017**, *9*, 10059-10066.