Two-Dimensional β-MoO_3@C nanosheets as high performance negative materials for supercapacitors with excellent cycling stability

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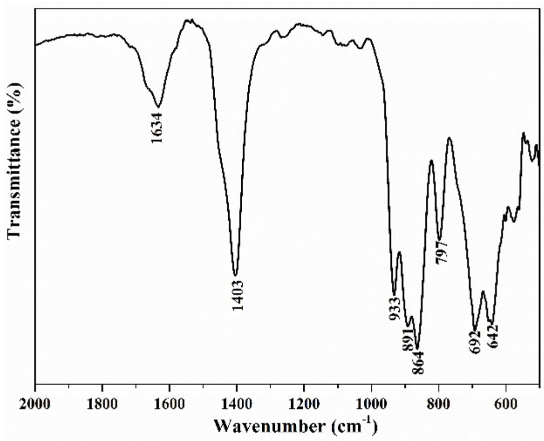

Fig. S1 Fourier transform Infrared (FTIR) spectrum of yellow precursor

Fig. S1 presents the IR spectra of the yellow precursor. The band at 1634 cm^{-1} is attributed to O-H stretching vibration of the crystal water. The band at 1403 cm^{-1} is attributed to the bending vibration of O-H. The bands below 1000 cm^{-1} are assigned to molybdate ion. The band at 1415 cm^{-1} attributed to ammonium group is absence. Therefore, the yellow precursor is molybdenum acid monohydrate.

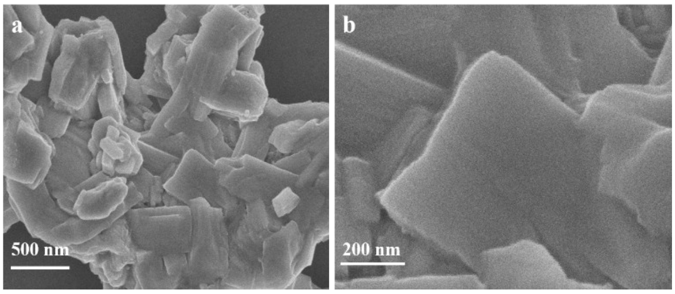

Fig. S2 SEM images of the 2D β-MoO_3 nanosheets

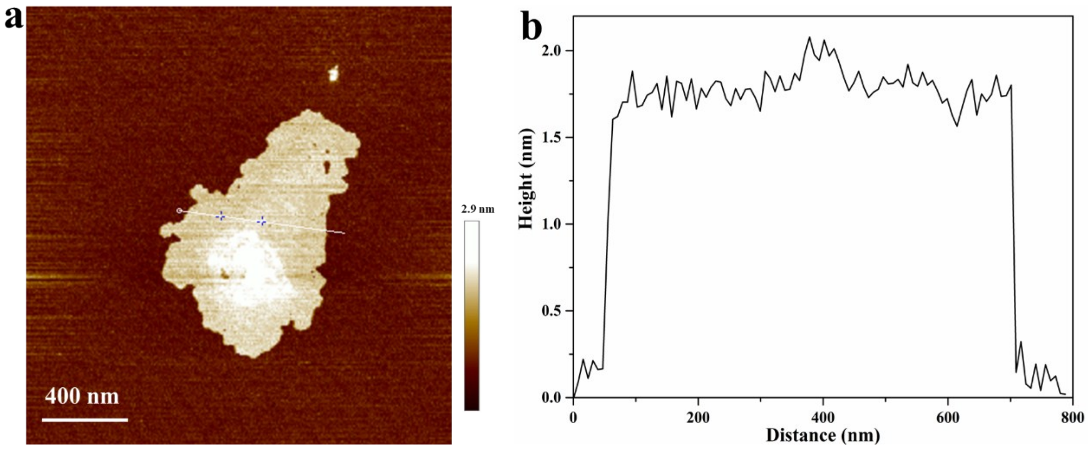

Fig. S3 (a) AFM height image of 2D β-MoO3@C nanosheets and (b) the corresponding height profile along the crossed lines.

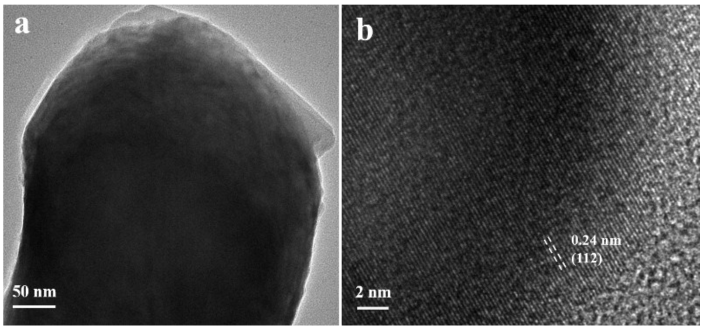

Fig. S4 (a) TEM and (b) HRTEM images of 2D β-MoO_3 nanosheets

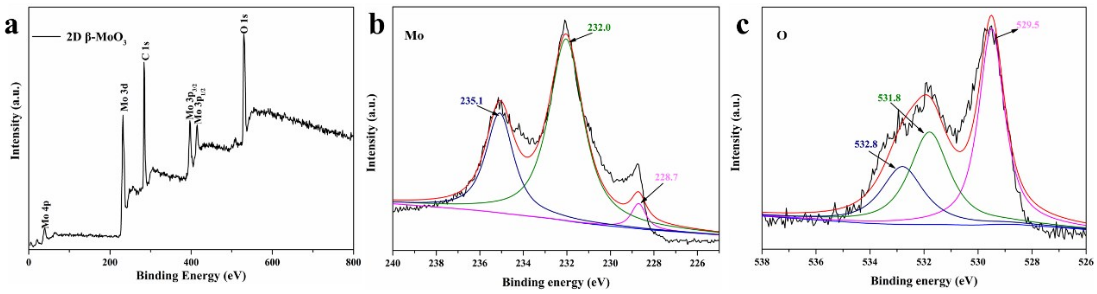

Fig. S5 (a) XPS survey spectra of 2D β-MoO_3 nanosheets. High-resolution (b) Mo 3d and (c) O 1s spectra of the 2D β-MoO_3 nanosheets.

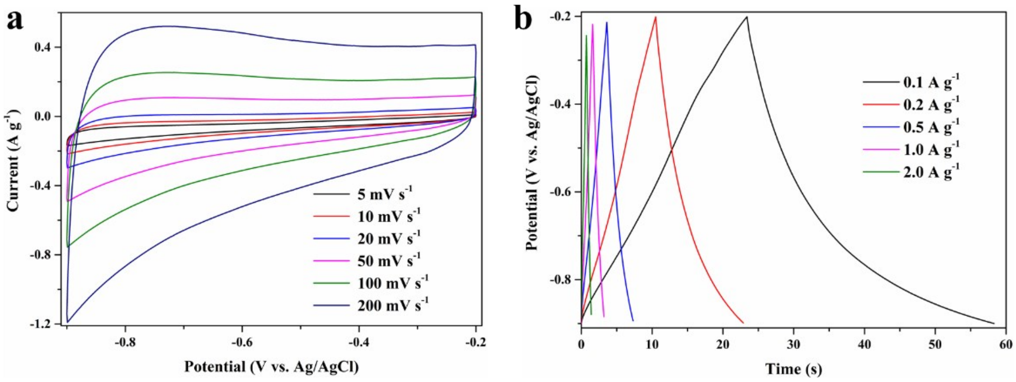

Fig. S6 (a) CV curves at scan rates from 5 to 200 mV s^{-1} and (b) Galvanostatic charge-discharge curves at various current density from 0.1 to 5.0 A g^{-1} of 2D β-MoO_3 nanosheets in 1M KOH solution.

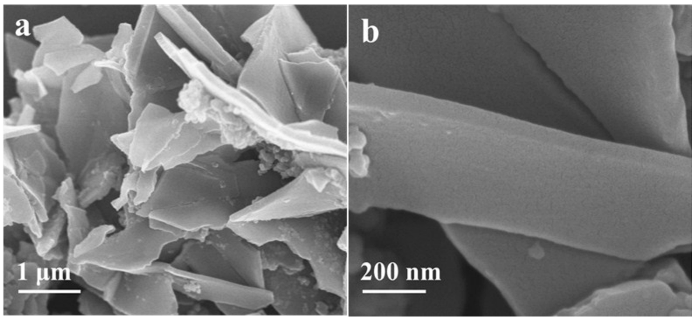

Fig. S7 SEM images of 2D β-MoO_3 nanosheets after electrochemical stability test

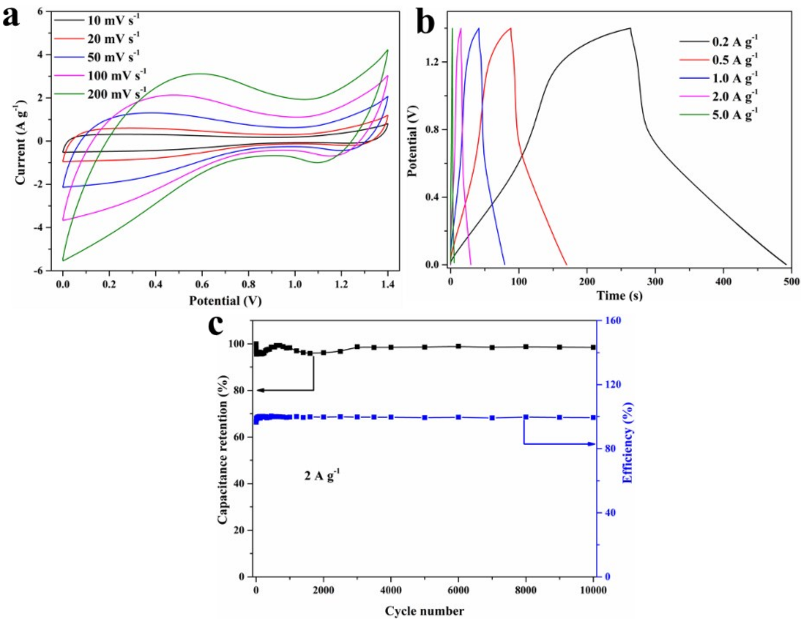

Fig. S8 (a) CV at different scan rates, (b) GCD curves at different current densities and (c) Long cycle performance of the HSC.

Table S1. Comparison of the cycling stability performances of Mo based materials for supercapacitors

Sample	Stability tests	Cycling stability	Ref.
2D β-MoO_3@C nanosheet	2 A g^{-1}	94% (50000 cycles)	**This work**
Polyaniline-h-MoO_3 hollow nanorods	50 mV s^{-1}	~80% (5000 cycles)	[1]
MoO_3/PPy/PANI composites	10 A g^{-1}	86% (20000 cycles)	[2]
MoO_3/C nanocomposites	1 A g^{-1}	86.5% (5000 cycles)	[3]
1T-MoS_2/PANI nanosheets	10 A g^{-1}	91% (2000 cycles)	[4]
MoO_3/PANI nanobelts	10 A g^{-1}	76.7% (3000 cycles)	[5]
Branchlike MoO_3/PPy	0.67 A g^{-1}	90% (200 cycles)	[6]
Tubular MoS_2/PPy	3 A g^{-1}	82% (3000 cycles)	[7]
MoS_2/PPy	1 A g^{-1}	85% (4000 cycles)	[8]
Tubular MoS_2/PANI	50 mV s^{-1}	88% (1000 cycles)	[9]
Graphene decorated with MoS_2 nanosheets	0.6 A g^{-1}	89.6% (1000 cycles)	[10]
rGO-MoS_2 2D sheets	1 A g^{-1}	88% (1000 cycles)	[11]
MoS_2-graphene hybrid films	2 A g^{-1}	93% (1000 cycles)	[12]

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