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Electronic Supplementary Information

PANI/MoO_{3-x} shell-core composites with enhanced rate and cycling performance for flexible solid-state supercapacitors and electrochromic applications

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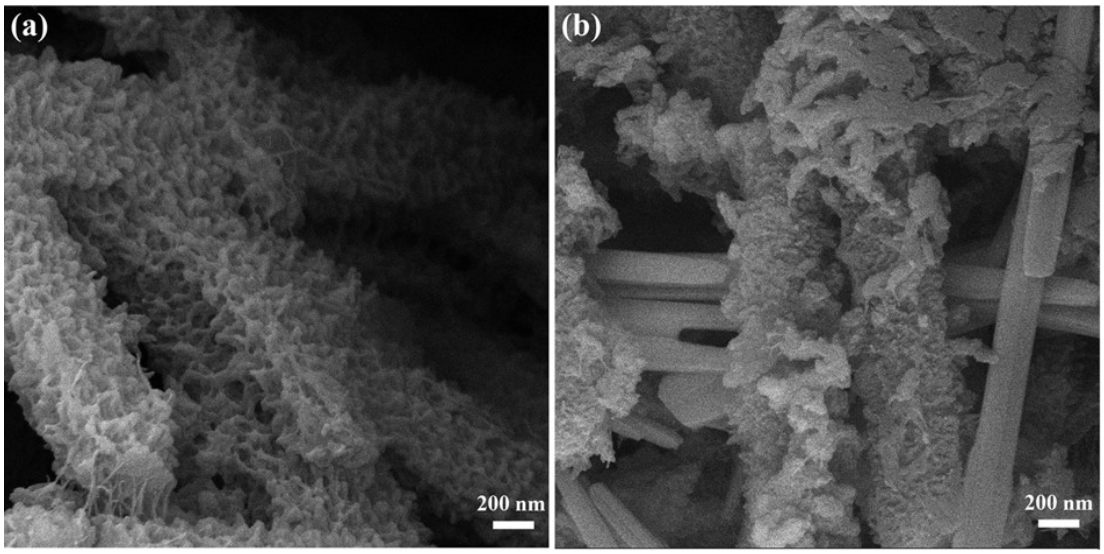

Fig. S1 SEM images of (a) PANI/MoO_{3-x}-1 and (b)PANI/MoO_{3-x}-3.

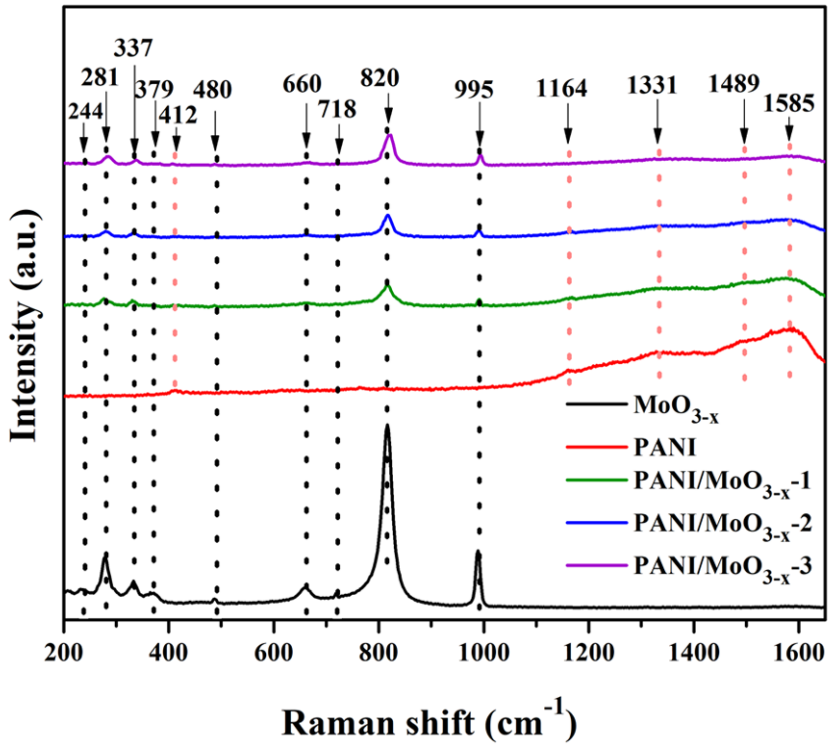

Fig. S2 Raman spectra of samples.

Table S1 FT-IR analyses of samples

Samples	C=C stretching vibration of quinonoid ring	C=C stretching vibration of benzenoid ring	C-N stretching vibration of benzenoid ring	C=N stretching vibration of quinonoid ring	C-H out-of-plane bending vibration of benzenoid ring	Mo=O symmetric stretching vibration	Mo–O–Mo asymmetry stretching vibration	Mo–O–Mo symmetry stretching vibration
	1583	1494	1292	1156	822	994	858	575
MoO_{3-x}						√	√	√
PANI	√	√	√	√	√			
PANI/MoO_{3-x} -1	√	√	√	√	√	√	√	√
PANI/MoO_{3-x} -2	√	√	√	√	√	√	√	√
PANI/MoO_{3-x} -3	√	√	√	√	√	√	√	√

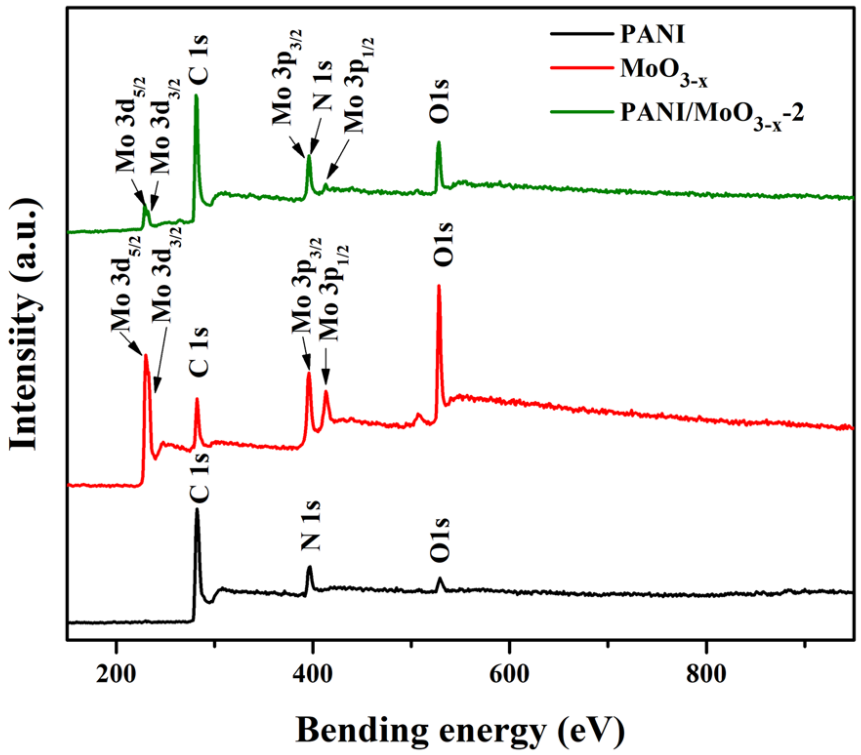

Fig. S3 XPS survey spectra of samples.

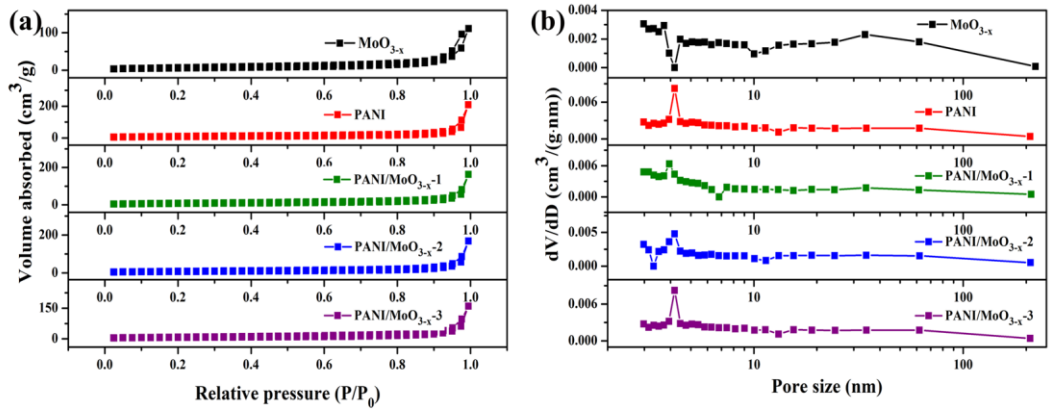

Fig. S4 (a) N_2 absorption/desorption isotherms and (b) pore size distributions of samples.

Table S2 The specific surface area and pore structure parameters of samples

Samples	S_{BET}[a] (m^2 / g)	V_{total}[b] (cm^3 / g)	$V_{mec+mac}$[c] (cm^3 / g)	D_{avg}[d] (nm)
PANI	27.434	0.3244	0.320	47.2
$PANI/MoO_{3-x}$-1	25.609	0.2533	0.249	39.6
$PANI/MoO_{3-x}$-2	26.017	0.2608	0.256	40.1
$PANI/MoO_{3-x}$-3	23.150	0.2480	0.246	42.8
MoO_{3-x}	21.344	0.1726	0.171	32.3

[a] Total specific surface area calculated by Brunaur-Emmett-Teller (BET) method.

[b] Total pore volume calculated at $P/P_0 = 0.99$.

[c] Meso-/Macropore volume calculated from BJH method.

[d] Average pore diameter calculated from the equation of $4V_t/S_{BET}$.

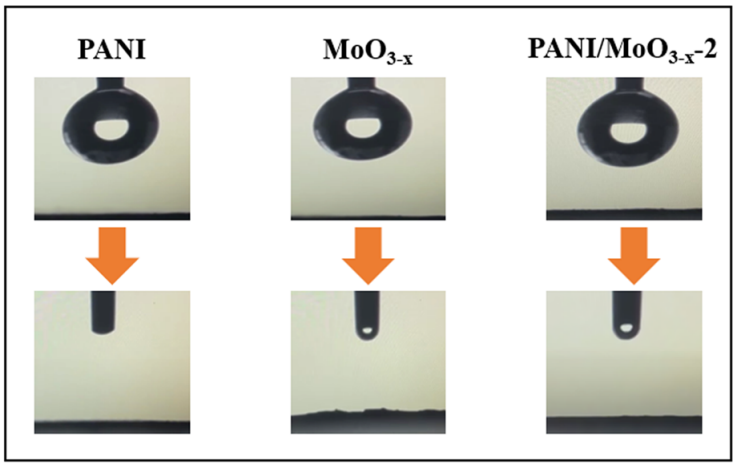

Fig. S5 The contact angle images of samples.

Table S3 Fitting values of equivalent circuit elements of samples.

Equivalent circuit elements	Samples				
	PANI	PANI/MoO_{3-x}-1	PANI/MoO_{3-x}-2	PANI/MoO_{3-x}-3	MoO_{3-x}
R_s (Ω)	1.472	1.049	1.018	1.385	1.083
CPE_T	0.00231	0.00023	0.00019	0.00029	0.00041
CPE_p	0.74116	1.002	0.78397	0.91366	0.94131
R_{ct} (Ω)	1.743	1.776	1.704	1.982	1.875
W_R	1.13	0.31872	0.25659	5.182	6.334
W_T	0.00093	0.00052	0.00032	0.34182	13.21
W_P	0.31133	0.30124	0.30549	0.36509	0.42363

R_s is the solution resistance.

CPE_T is the capacitance when CPE_P=1.

CPE_P is the constant phase element exponent.

R_{ct} is the charge transfer resistance.

W_R is the diffusion resistance (Warburg diffusion resistance).

W_T is the diffusion time constant.

W_P is a fractional exponent between 0 and 1.

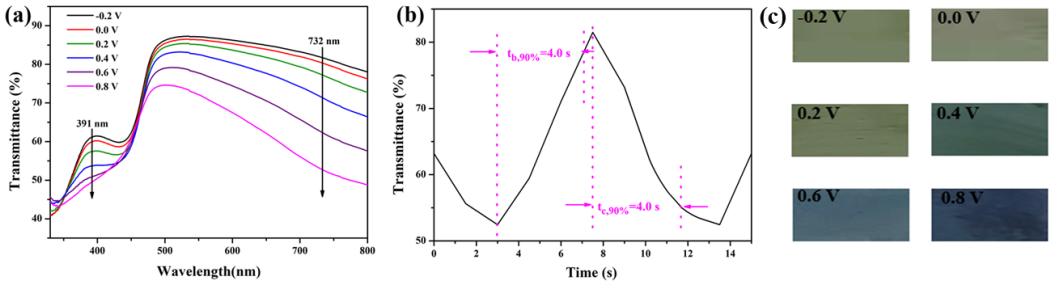

Fig. S6 Electrochromic performance of PANI/MoO_{3-x}-1: (a) UV-vis transmission spectra; (b) in situ optical response between the colored and bleached states from -0.2 to 0.8 V for 10 s at 732 nm; (c) the photos of color changes under different potentials.

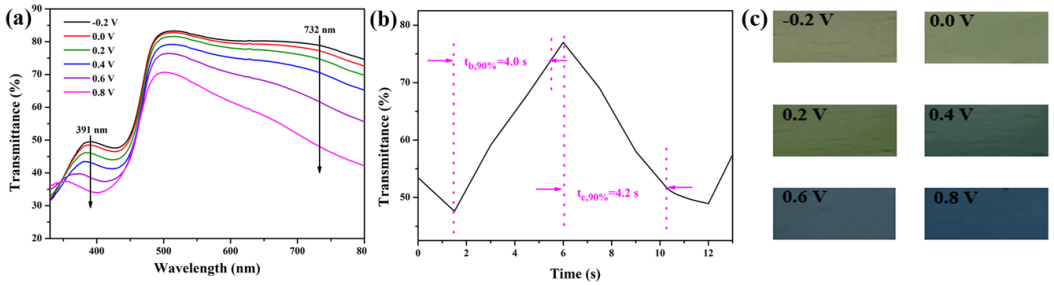

Fig. S7 Electrochromic performance of PANI/MoO_{3-x}-3: (a) UV-vis transmission spectra; (b) in situ optical response between the colored and bleached states from -0.2 to 0.8 V for 10 s at 732 nm; (c) the photos of color changes under different potentials.

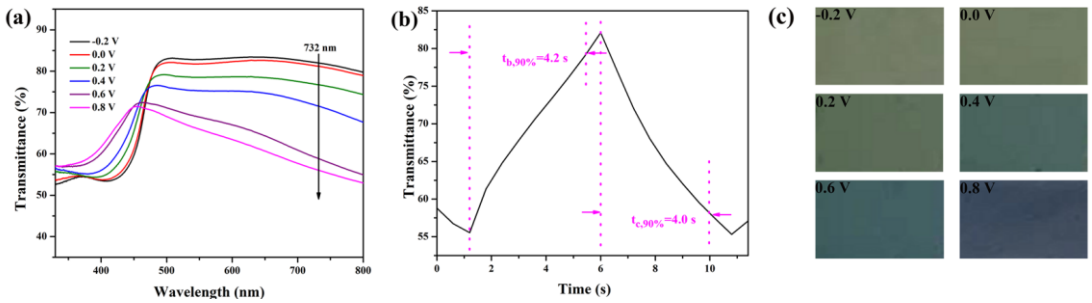

Fig. S8 Electrochromic performance of PANI: (a) UV-vis transmission spectra; (b) in situ optical response between the colored and bleached states from -0.2 to 0.8 V for 10 s at 732 nm; (c) the photos of color changes under different potentials.