Supporting Information

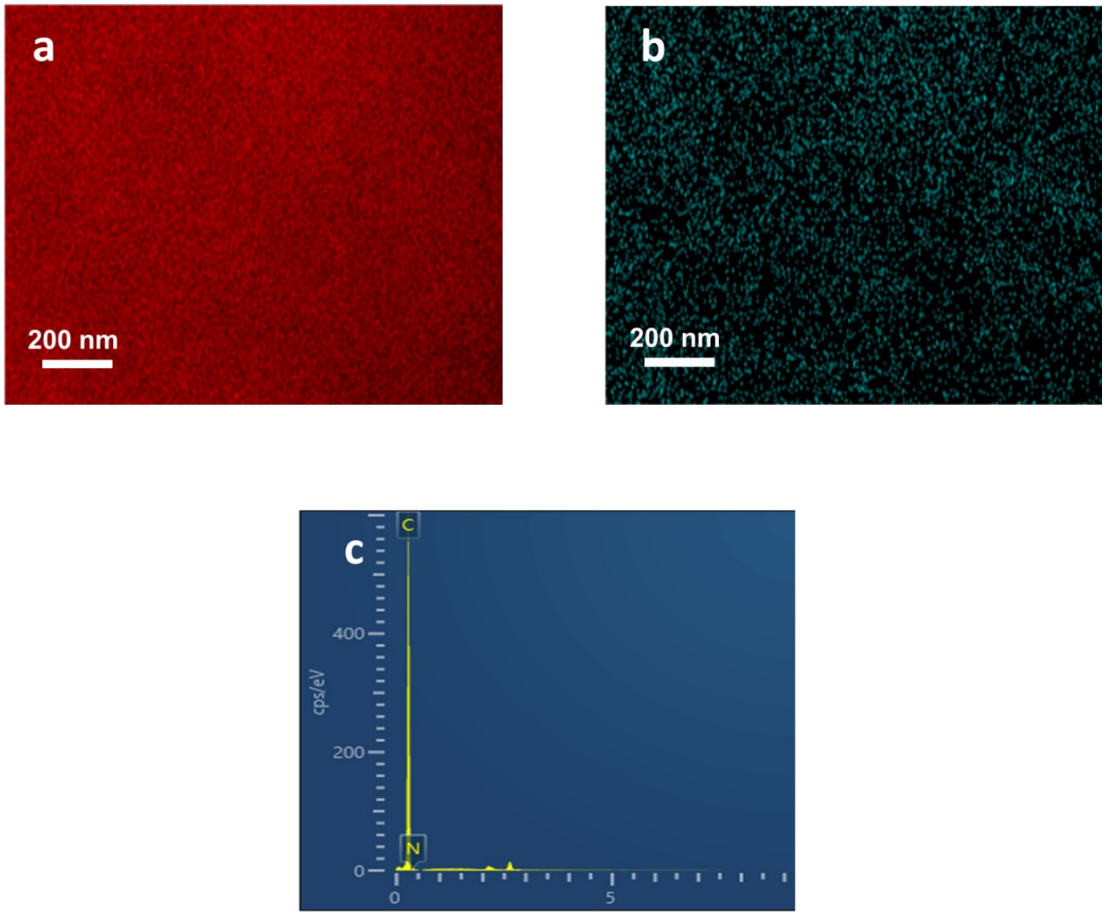

Fig. S1 Elemental mappings of (a) C and (b) N of CNTs@PANI. (c) Average content of C and N.

Table S1 Map Sum Spectrum.

Element	Signal Type	Wt%	Wt%Sigma	Atomic%
C	EDS	91.4	0.3	92.5
N	EDS	8.6	0.3	7.5

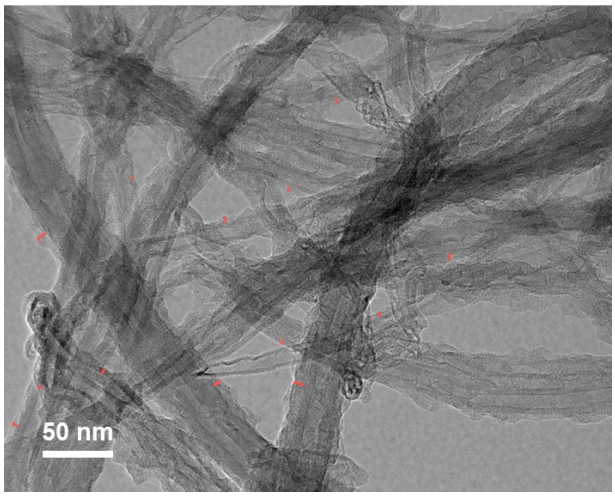

Fig. S2 TEM images of CNTs@PANI.

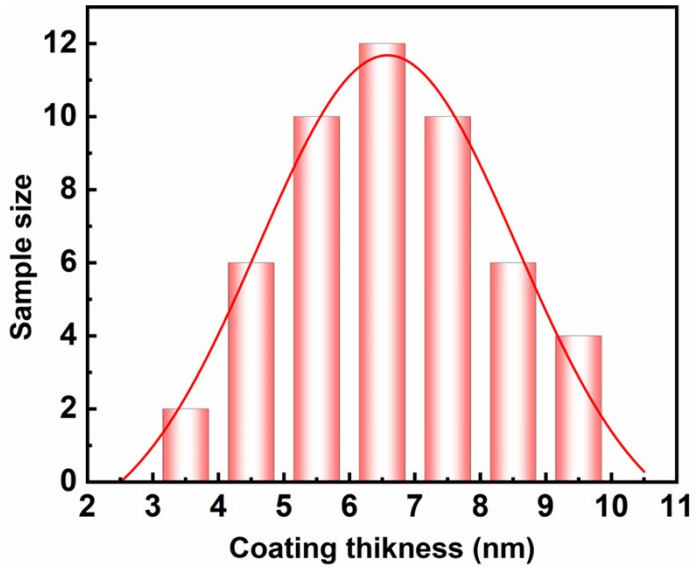

Fig. S3 Histogram showing the distribution of PANI coating thickness measured from 50 random positions along the CNTs axis.

Table S2 Morphological parameters of P/C-3:1 (PMM), R/C-3:1, P/C-3:1, P/C-1:1, P/C-1:3, and P/C-1:6 composites.

Sample	Fiber Coverage (%)	Inter-fiber spacing (μm)	Agglomerate Size (μm)
P/C-3:1 (PMM)	6 ± 2	＞1	0.1-1
R/C-3:1	6 ± 5	＞1.2	-
P/C-3:1	7 ± 2	＞1	-
P/C-1:1	22 ± 5	0.1-0.3	-
P/C-1:3	75 ± 8	＜0.05	-
P/C-1:6	87 ± 7	＜0.05	0.1-0.4

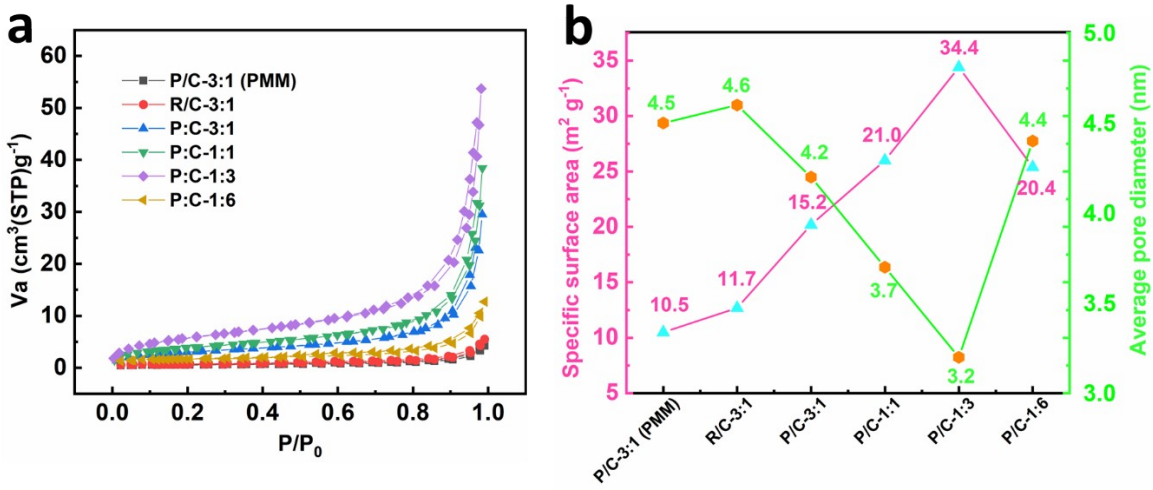

Fig. S4 (a) Nitrogen adsorption-desorption isotherms and (b) specific surface area and average pore diameter of P/C-3:1 (PMM), R/C-3:1, P/C-3:1, P/C-1:1, P/C-1:3 and P/C-1:6.

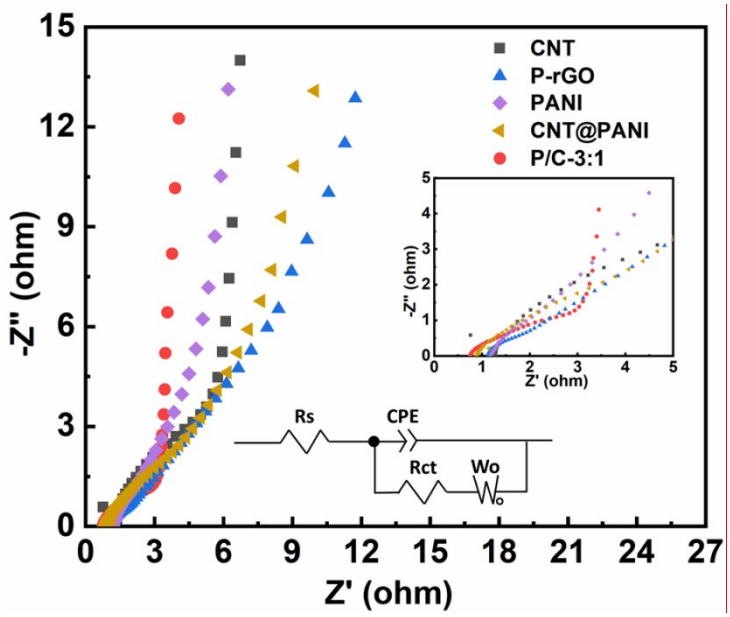

Fig. S5 Nyquist plots of CNTs, PANI, P-rGO, CNTs@PANI and P:C-3:1.

Table S3 The fitted values of Rs and Rct for all samples

Samples	R_s (Ω)	R_{ct} (Ω)
CNTs	1.34	8.05
P-rGO	1.14	7.57
PANI	1.19	6.23
CNTs@PANI	0.91	4.25
P:C-3:1 (PMM)	0.97	7.18
R:C-3:1	0.98	6.54
P:C-3:1	0.77	3.16
P:C-1:1	0.67	3.07
P:C-1:3	0.42	2.24
P:C-1:6	0.68	2.86

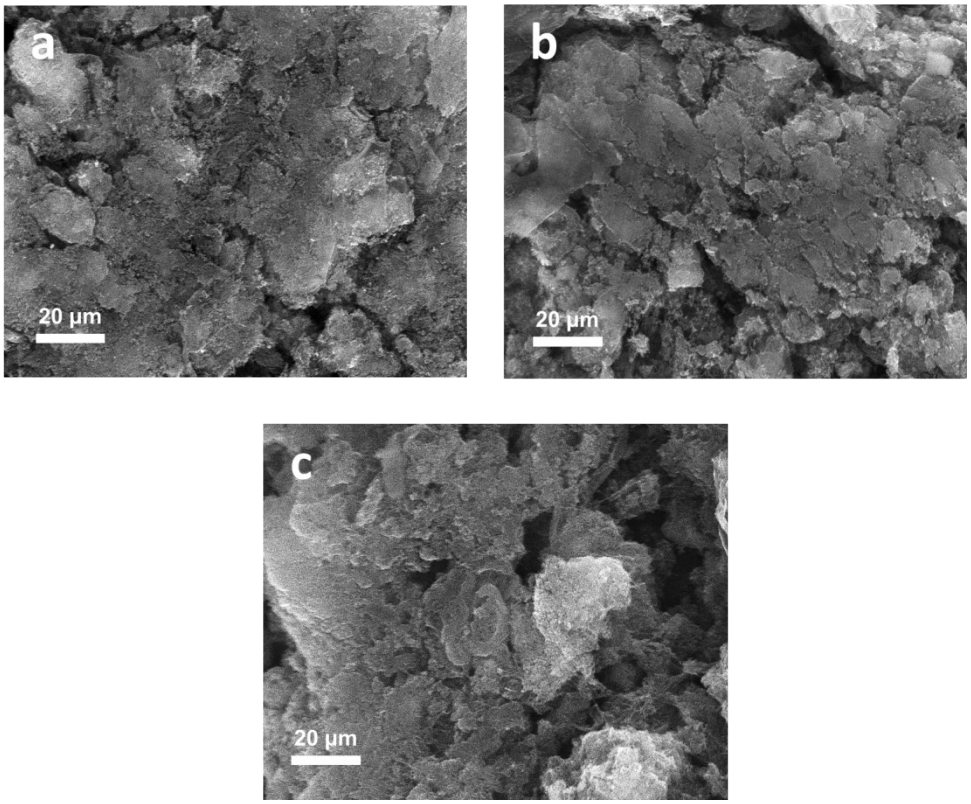

Fig. S6 SEM images of P:C-1:3 after (a) 0, (b)5000 and (c)10000 CV cycles at 200mV s^{-1}.

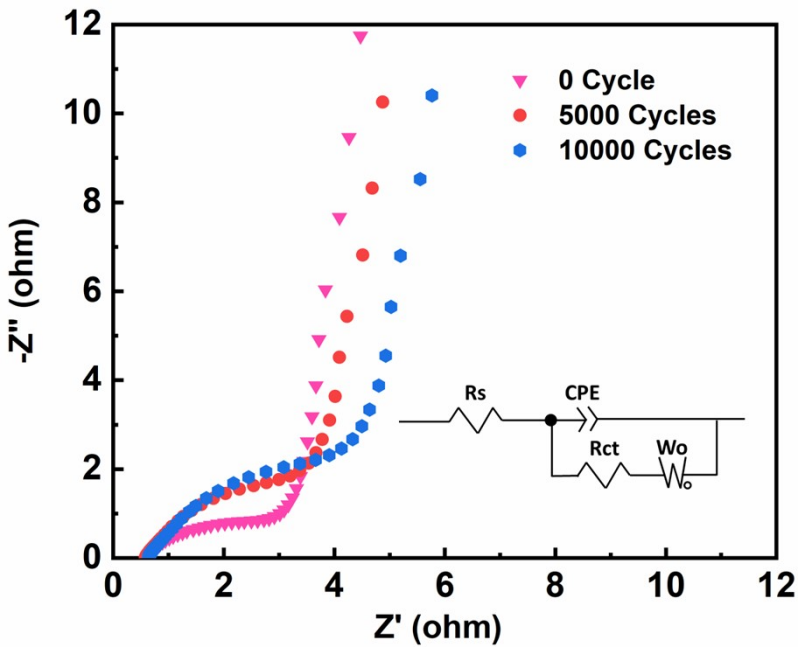

Fig. S7 Nyquist plots of P:C-1:3 after different CV cycles at 200mV s^{-1}.

Table S4 A performance comparison of this work with other related materials reported.

Material	Electrolyte	Specific Capacitance	Rate Capability	Cycling Stability of	Ref.
CrOOH/rGO	6 M KOH	199.8 mF/cm² (5 mV s^{-1})	5→250 mV s^{-1}: 29.5%	88% after 10,000 cycles	37
WS_2/PANI/C	1 M Na_2SO_4	464 F g^{-1} (10 mV s^{-1})	0.5→8 A g^{-1}: 37.1%	-	38
mC/PANI	PVA/H_2SO_4 gel	107.8 F g^{-1} (0.5 A g^{-1})	0.5→5 A g^{-1}: 69.6%	68.1% after 2,000 cycles	39
MWCNTs/PTB	1 M H_2SO_4	232.7 F g^{-1} (1 A g^{-1})	1→20 A g^{-1}: 69.1%	91.9% after 5,000 cycles	40
Pd/MoO_3/rGO	6 M KOH	291.5 F g^{-1} (0.5 A g^{-1})	0.5→5 A g^{-1}: 51.5%	88.5% after 1,000 cycles	41
PANI/CdO	3 M KOH	906.8 F g^{-1} (9.26 A g^{-1})	9.26→46.3 A g^{-1}: 44.1%	82% after 10,000 cycle	42
NMr	0.5 M Na_2SO_4	420 F g^{-1} (1 A g^{-1})	1→4 A g^{-1}: 83.3%	>90% after 20,000 cycles	43
P/C-1:3	1M HCl	389.8 F g^{-1} (1 A g^{-1})	1→10 A g^{-1}: 74.1%	88.3% after 10,000 cycles	This work