Supplementary Information

Nacre-like laminate nitrogen-doped porous carbon/carbon nanotubes/graphene composite for excellent comprehensive performance supercapacitors

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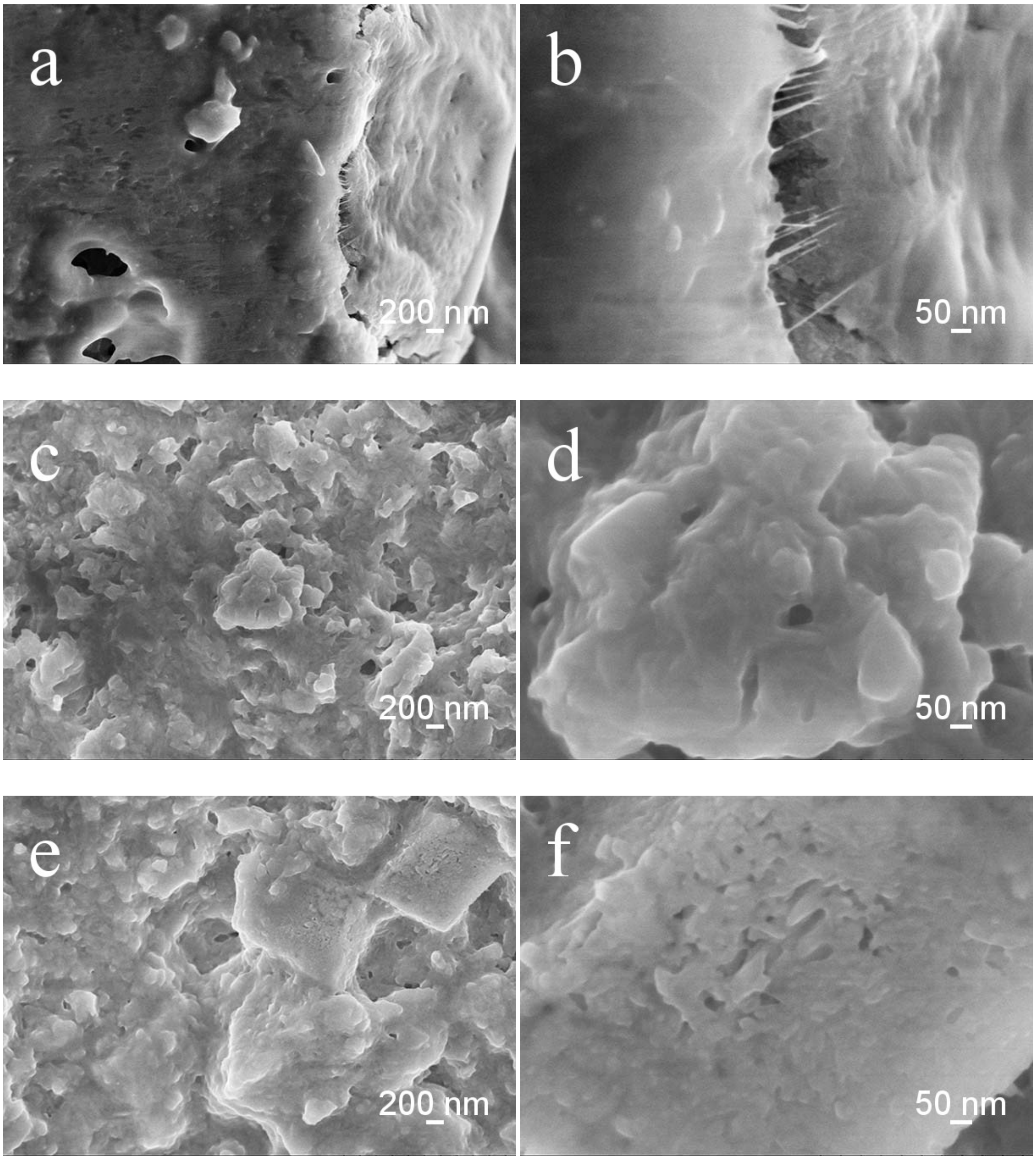


Fig. S1. The SEM images of precursors: (a, b) PGMC, (c, d) PGC and (e, f) PMC.

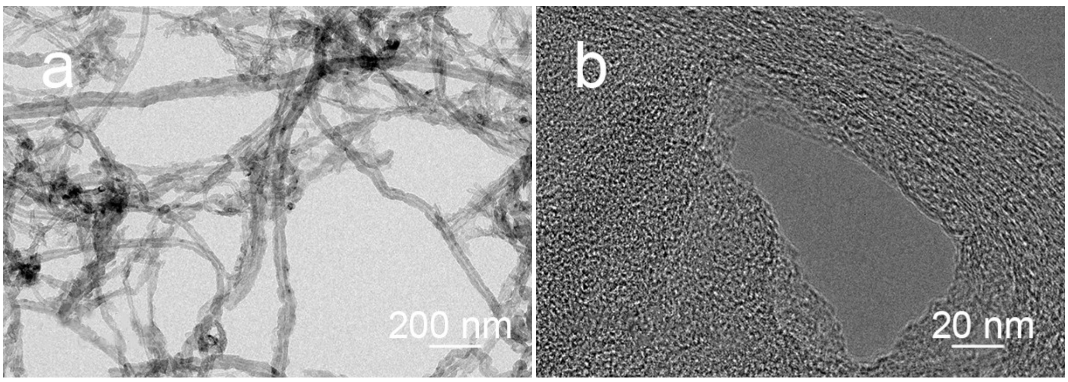


Fig. S2. The TEM images of acid treated MWNTs.

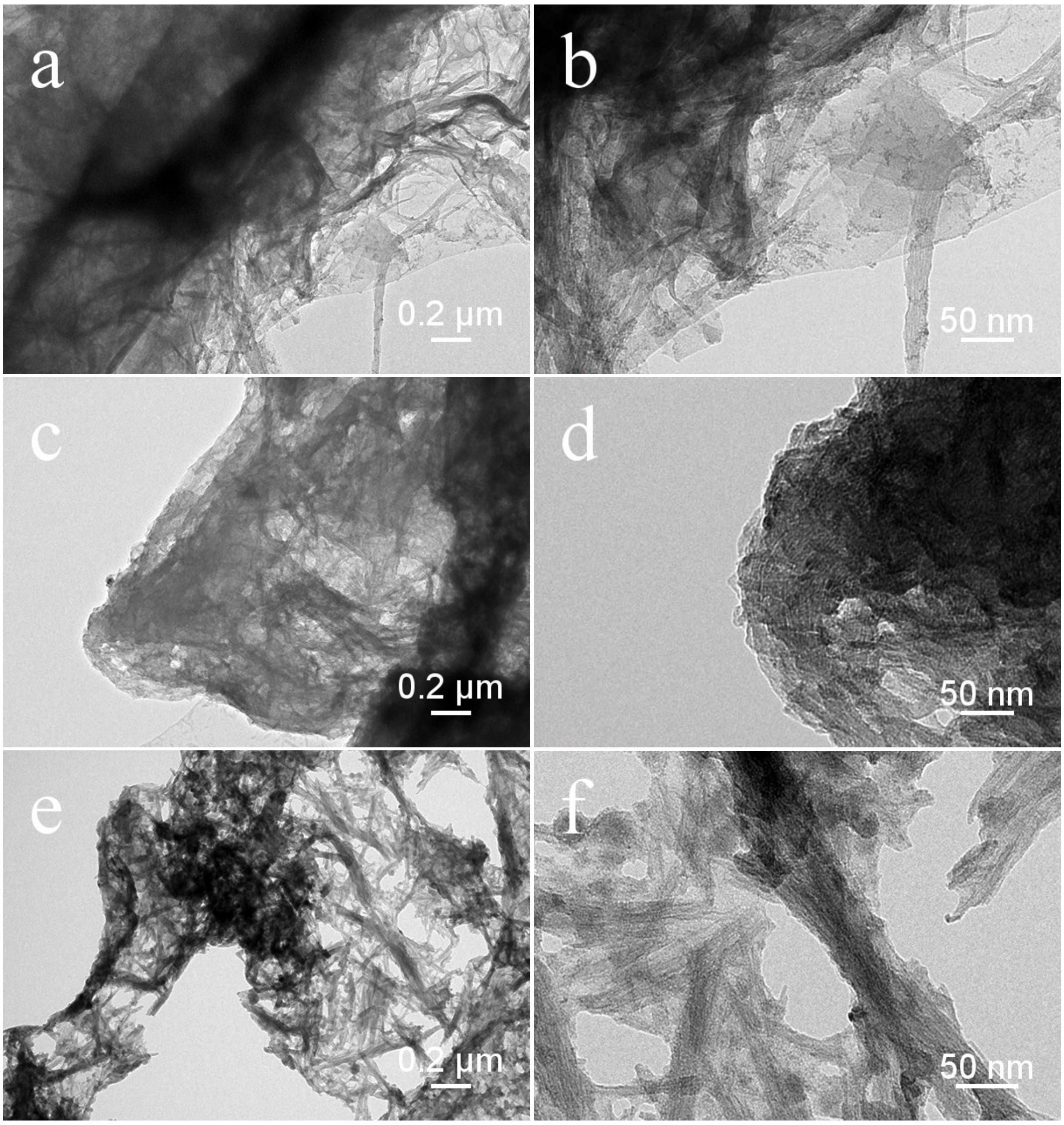
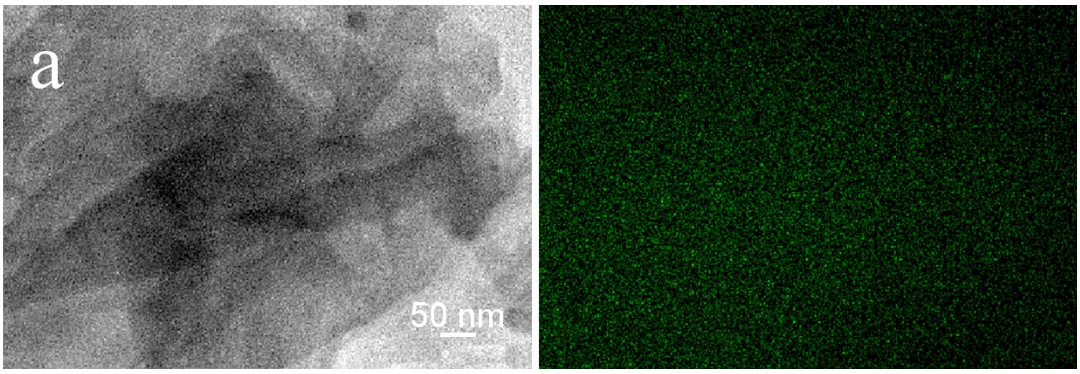


Fig. S3. The TEM images of precursors: (a, b) PGMC, (c, d) PGC and (e, f) PMC.



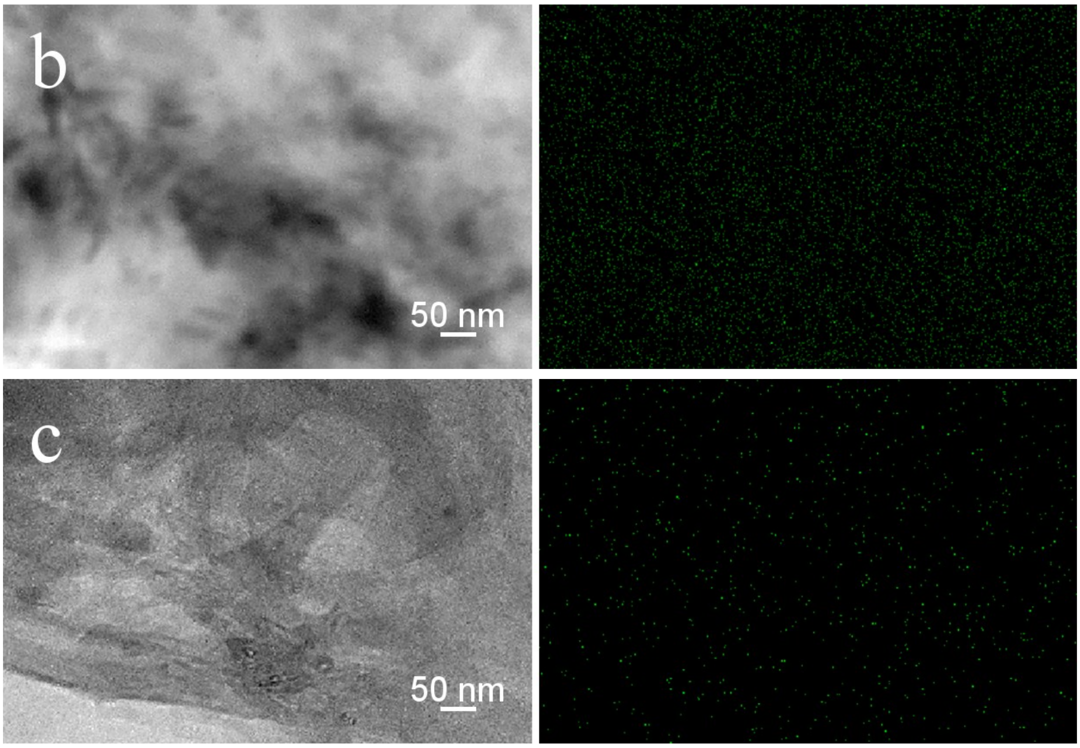


Fig. S4. The TEM images and nitrogen atom mapping images of (a) PGMC, (b) PGC and (c) PMC.

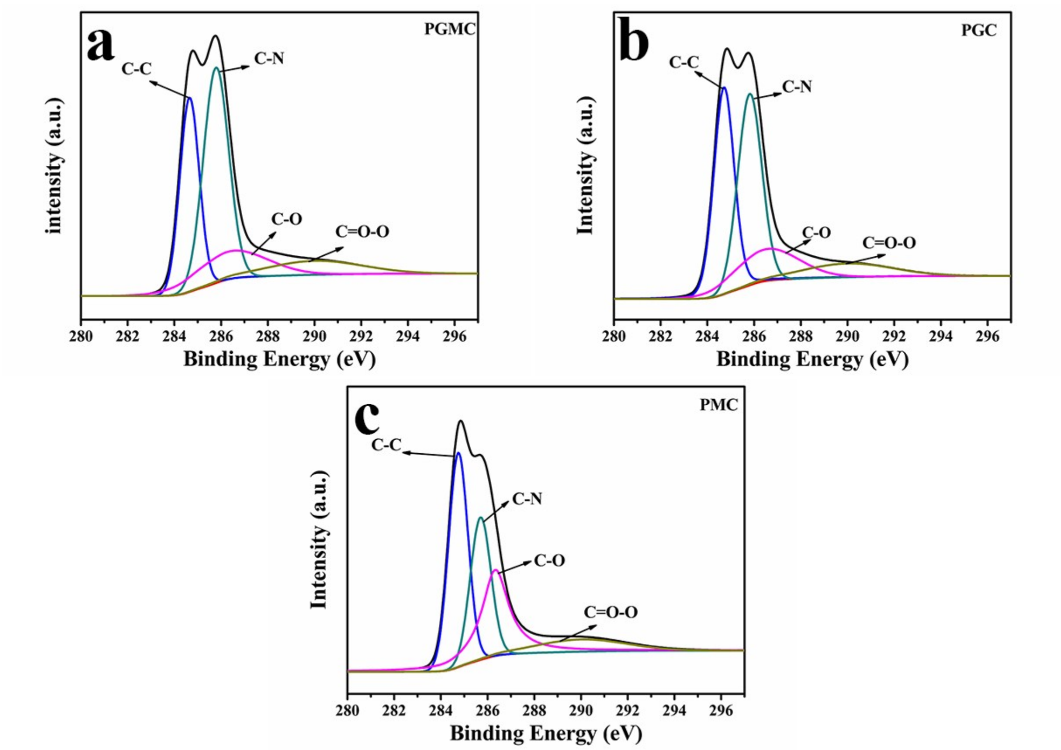


Fig. S5. The C 1s XPS spectra of PGMC, PGC and PMC.

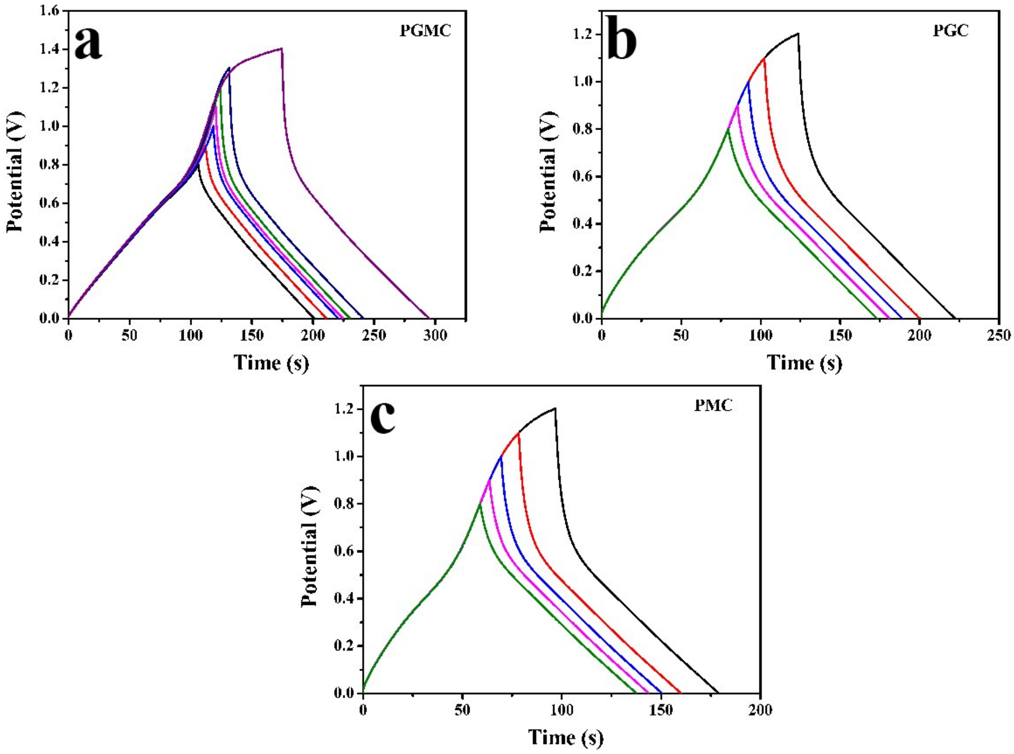


Fig. S6. Charge/discharge curves of the PGMC, PGC and PMC composite electrodes measured at current density of 1 A g^{-1} in two-electrode system..

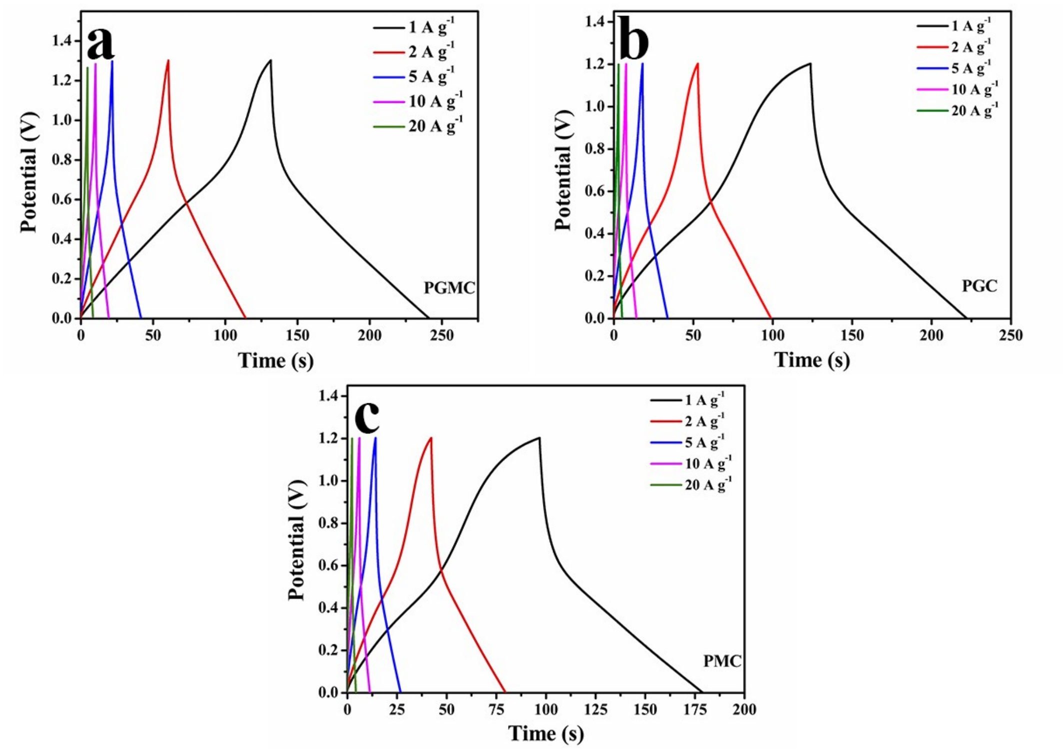


Fig. S7. Charge/discharge curves of composite at different current density: (a) PGMC, (b) PGC and (c) PMC in two-electrode system.

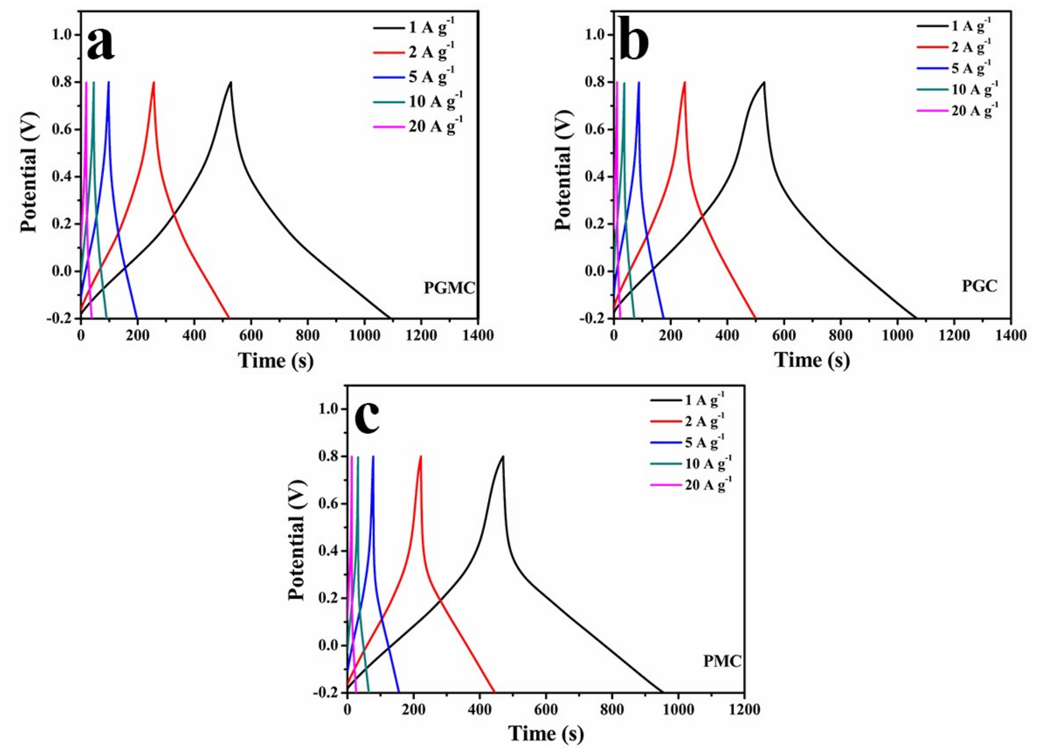


Fig. S8. Charge/discharge curves of composite at different current density: (a) PGMC, (b) PGC and (c) PMC in three-electrode system.

Table S1. Elemental composition of samples

Sample	N (wt%)	C (wt%)	H (wt%)	O (wt%)
PGMC	17.36	65.52	2.86	14.26
PGC	16.74	68.17	2.85	12.24
PMC	13.88	67.24	2.69	16.19

Table S2. Summary of the specific capacitance of some electrodes

Electrode materials	Gravimetric capacitance (F g^{-1})	Volumetric capacitance (F cm^{-1})	Scan rate	Electrolyte	Ref.
Graphene nanomesh-carbon nanotube hybrid (GNCN)	294	331	5 mV s^{-1}	6 M KOH	S1
Binder-free film (HrGO)	251	216	1 A g^{-1}	6 M KOH	S2
Nitrogen-doped holey graphene (HG)	375	439	0.1 A g^{-1}	6 M KOH	S3
Compact PANI–CCG film	458	572	5 A g^{-1}	1 M H_2SO_4	S4

Nitrogen-doped active carbon/graphene (N-AC/Gr)	378.9	257.7	0.05 A g^{-1}	6 M KOH	S5
Molecular stitching of graphene film (PPD-graphene)	459	711	0.5 A g^{-1}	1 M H_2SO_4	S6
High-density PANI/graphene composite	546	802	0.5 A g^{-1}	1 M H_2SO_4	S7
N,B co-doped graphene	-	488	10 mV s^{-1}	PVA/H_2SO_4	S8
Crumpled RGO	396	330	0.40 A cm^{-3}	6 M KOH	S9
FGN-300	456	470	0.5 A g^{-1}	6 M KOH	S10
3D graphene	341	436	1 mV s^{-1}	6 M KOH	S11
RGO	182	255	1 A g^{-1}	6 M KOH	S12
EM-CCG	192	256	0.1 A g^{-1}	1 M H_2SO_4	S13
Porous carbon films	240	220	10 mV s^{-1}	0.5 M H_2SO_4	S14
N-doped porous carbon	305	305	2 mV s^{-1}	6 M KOH	S15
PMC	485	553	1 A g^{-1}	1 M H_2SO_4	Present work
PGC	538	877	1 A g^{-1}	1 M H_2SO_4	Present work
PGMC	563	782	1 A g^{-1}	1 M H_2SO_4	Present work

Table S3. Summary of the electrochemical performance of symmetric supercapacitors in aqueous electrolyte.

Electrode materials	E_g (W h kg^{-1})	P_g (W kg^{-1})	E_V (W h L^{-1})	P_V (W L^{-1})	Electrolyte	Ref.
High-density PANI/graphene composite	-	-	17.8	29.4	1 M H_2SO_4	S7
heteroatom-doped porous carbon-tube	-	-	12.15	700	1 M Na_2SO_4	S16
MXene-based fibres	-	-	5.1	1700	PVA/H_2SO_4	S17
N-doped holey graphene/PANI slice	-	-	26.5	175.3	1 M H_2SO_4	S18
graphene composite films by molecular level couplings	-	-	7.18	2.92	PVA/H_2SO_4	S19
Nitrogen-doped active carbon/graphene (N-	13.1	12.5	11.1	10.6	6 M KOH	S5

AC/Gr)						
Solution Processable MXene and Electrochemically Exfoliated Graphene	-	-	3.4	200	PVA/H_3PO_4	S20
GHTC-a	8.4	22.5	-	-	6 M KOH	S21
Nitrogen-enriched porous carbon nanofiber	5.1	10000	-	-	6 M KOH	S22
Nitrogen-doped hierarchical porous carbon	5.43	10000	-	-	6 M KOH	S23
hollow particle-based nitrogen-doped carbon nanofibers	10.96	250	-	-	2 M H_2SO_4	S24
N-YSHMCSs	7.9	1600	-	-	1 M H_2SO_4	S25
PGC	16.4	600	26.7	978	1 M H_2SO_4	Present work
PMC	13.7	595	15.6	678	1 M H_2SO_4	Present work
PGMC	13.72	12997	19.1	18000	1 M H_2SO_4	Present work
PGMC	19.8	650	27.51	904	1 M H_2SO_4	Present work

Note: E_g: gravimetric energy density, P_g: gravimetric power density, E_v: volumetric energy density, P_v: volumetric power density.

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