Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

In-situ formation/carbonization of quinone-amine polymers towards hierarchical-pore carbon foam with high faradaic activity for energy storage

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Figures and tables

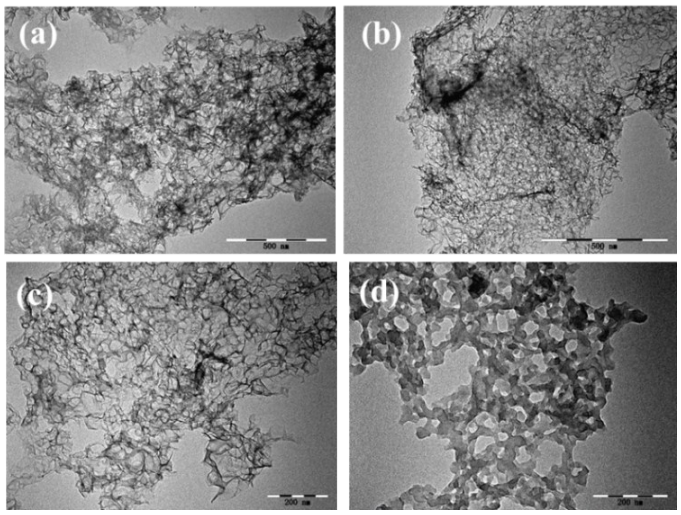

Fig. S1 TEM images of the carbonized PAQ at different temperature. (a) 650 °C, (b) 750 °C, (c) 850 °C, and (d) PAQ without carbonization.

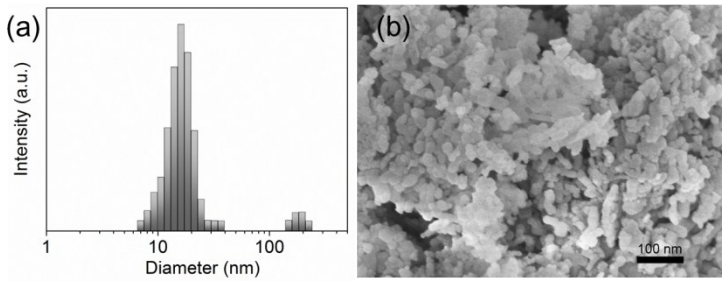

Fig.S2 (a) particle size distributions of MgO measured by dynamic light scattering. (b) SEM image of MgO.

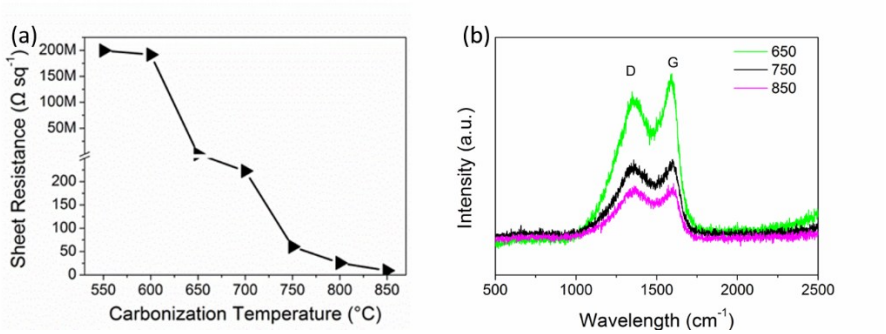

Fig. S3 (a) Sheet resistances and (b) Raman spectra of the N,O-PCFs carbonized at different temperature.

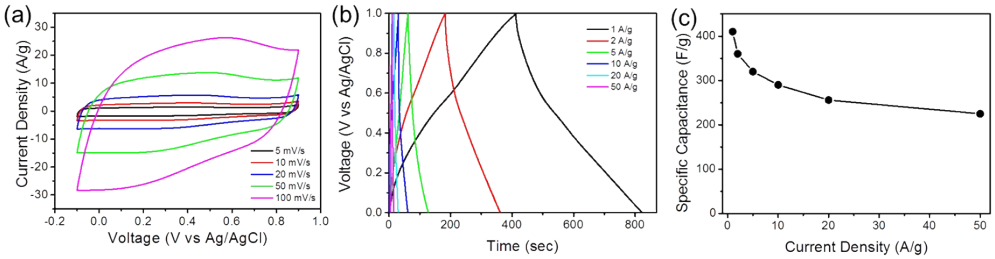

Fig. S4 Three-electrode system electrochemical test of N,O-PCF750. (a) CV curves at different scan rates. (b) CP curves at different current densities. (c) Specific capacitance versus current density.

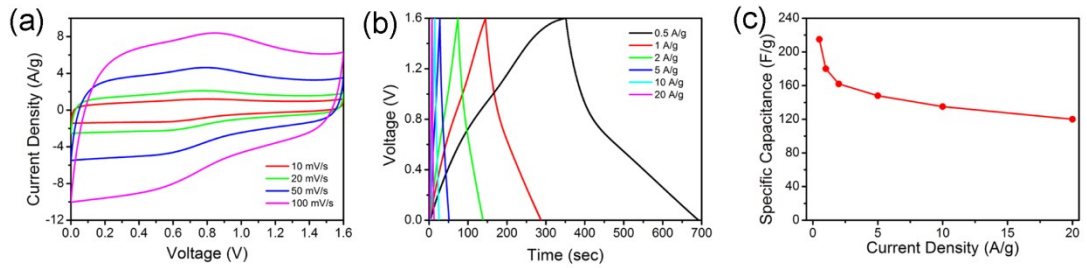

Fig. S5 The symmetrical supercapacitor electrochemical measurements of N,O-PCF750 in 1M Li_2SO_4. (a) CV curves at different scan rates. (b) CP curves at different current densities. (c) Specific capacitance versus current density.

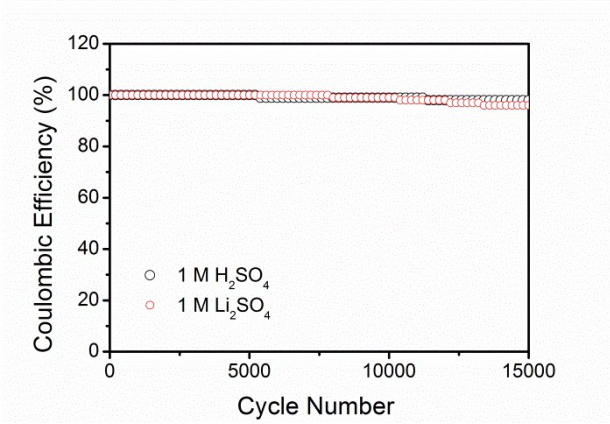

Fig. S6 The Coulombic efficiency of symmetrical supercapacitors.

Table S1 BET surface area, resistance, and oxygen and nitrogen content obtained by XPS and element analysis of the N,O-PCFs carbonized at different temperature.

Carbonization Temperature/°C	650	750	850
BET Surface Area (m^2/g)	861	1215	931
Resistance (Ω/sq)	4.57×10^4	60.55	9.18
Content of Oxygen (at.%) by XPS	6.10	5.24	5.11
Content of Nitrogen (at.%) by XPS	7.56	7.02	4.12
Content of Oxygen (at.%) by element analysis	6.33	5.31	5.19
Content of Nitrogen (at.%) by element analysis	8.05	7.18	4.68

Table S2 The relative contents of nitrogen and oxygen species of N,O-PCF750 calculated by the XPS fitting peak area.

N species	Pyridinic	Pyrrolic	Graphitic	Pyridine-N-oxide	
Relative contents (%)	13.9	38.8	44.3	3.0	
O species	Quinone O	-COOH	-C=O	-C-O	-OH
Relative contents (%)	25.8	14.9	31.7	14.3	13.3

Table S3 Comparison to the recently reported heteroatom-doped carbon-based electrode materials for symmetrical supercapacitors in aqueous electrolyte

Electrode Materials	Electrolyte	Specific Capacitance	Energy Density	Cycling Stability	Ref.
PpPD/graphene	1 M H_2SO_4	248 F/g@2 A/g	8.6 Wh/kg@0.5 kW/kg	72%,1000@10A/g	[44]
3D graphene	1 M H_2SO_4	250 F/g@1 A/g	8.9 Wh/kg@0.05 kW/kg	-	[45]
NMCNF	2 M Li_2SO_4	-	12.5 Wh/kg@0.072 kW/kg	85%,1000@5A/g	[38]
hNCNC	6 M KOH	313 F/g@1 A/g	10.9 Wh/kg@0.25 kW/kg	98%,20000@10A/g	[24]
N-carbon nanofiber	1 M H_2SO_4	220 F/g@0.25 A/g	5.9 Wh/kg@1.2 kW/kg	106%,20000@1A/g	[46]
RGO-HD	6 M KOH	182 F/g@1 A/g	4.4 Wh/kg@0.25 kW/kg	99%,4000@10A/g	[47]
FT-PNCNF	1 M KOH	247 F/g@10 mV/s	-	95%,8000@0.5V/s	[48]
N,S-PCN	1 M Na_2SO_4	187 F/g@0.2 A/g	21 Wh/kg@0.18 kW/kg	99.7%,10000@2A/g	[49]
N-graphene	6 M KOH	312 F/g@0.1 A/g	-	100%,1000@10A/g	[50]
HPCF	6 M KOH	158 F/g@0.1 A/g	9.1 Wh/kg@3.5 kW/kg	-	[51]
N, O-PCF	1 M H_2SO_4	321 F/g@1 A/g	11.51 Wh/kg@0.25 kW/kg	97%,20000@5A/g	This
	1 M Li_2SO_4	216 F/g@0.5 A/g	15.91 Wh/kg@0.4 kW/kg	96%,15000@5A/g	work