Electronic Supplementary Information

Synergistic design of N, O codoped honeycomb carbon electrode and ionogel electrolyte enabling all-solid-state supercapacitor with an ultrahigh energy density

Ziyang Song,[a] Liangchun Li,[a] Dazhang Zhu,[a] Ling Miao,[a] Hui Duan,[a] Zhiwei Wang,[b] Wei Xiong,[c] Yaokang Lv,[d] Mingxian Liu,*[ab] and Lihua Gan*[a]

[a] Shanghai Key Lab of Chemical Assessment and Sustainability, School of Chemical Science and Engineering, Tongji University, Shanghai 200092, P. R. China.

[b] State Key Laboratory of Pollution Control and Resources Reuse, Shanghai Institute of Pollution Control and Ecological Security, School of Environmental Science and Engineering, Tongji University, Shanghai 200092, P. R. China.

[c] Key Laboratory for Green Chemical Process of Ministry of Education, School of Chemistry and Environmental Engineering, Wuhan Institute of Technology, Wuhan 430073, P. R. China.

[d] College of Chemical Engineering, Zhejiang University of Technology, Hangzhou 310014, P. R. China.

***Corresponding Authors**

E-mail: liumx@tongji.edu.cn, ganlh@tongji.edu.cn

Table S1 Synthesis parameters of HPC[a].

Samples	Effect factors	Water (mL)	Temperature (ºC)
HPC-1	Solvent	120	700
HPC-2		180	700
HPC-3		240	700
HPC-4	Temperature	180	600
HPC-5		180	800
HPC-6		180	900

[a]Temperature: activation temperature; S_{BET}: specific surface area; N, O: nitrogen and oxygen contents of HPC; C_m: gravimetric specific capacitance of HPC electrodes tested in three-electrode system using KOH electrolyte.

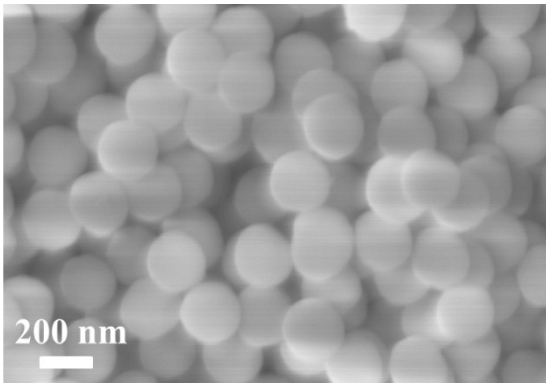

Fig. S1 SEM image of SiO_2.

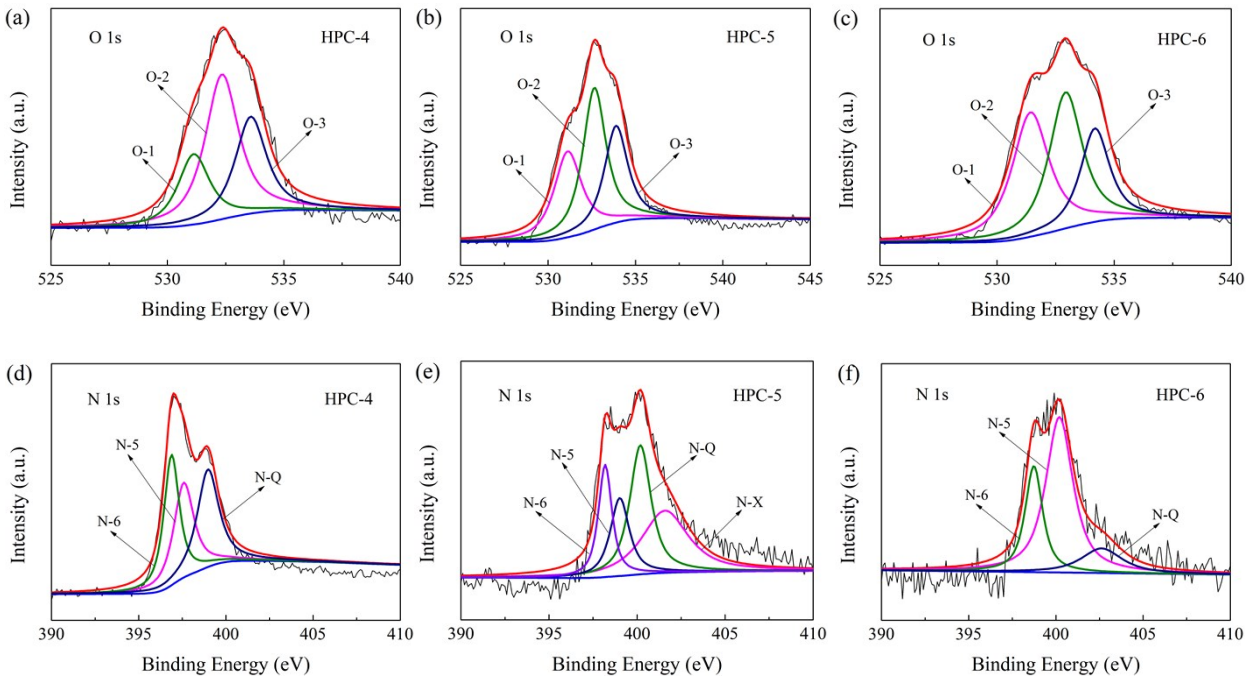

Fig. S2 High-resolution XPS spectra of O 1s (a–c) and N 1s (d–f) for HPC-4 (a, d), HPC-5 (b, e) and HPC-6 (c, f) prepared at different activation temperatures.

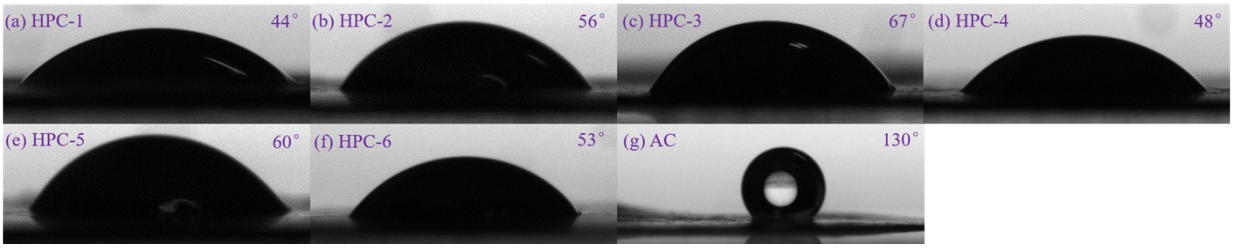

Fig. S3 The water contact angles of HPC (a–f) and commercial activated carbon (AC, g).

Table S2 Elemental compositions (wt.%) of HPC and relative contents of N and O species to N 1s and O 1s in HPC.

Samples	N	O	N-6 (%) 398.1 eV	N-5 (%) 399.8 eV	N-Q (%) 401.3 eV	O-1 (%) 530.5 eV	O-2 (%) 531.8 eV	O-3 (%) 533.7 eV
HPC-1	8.72	15.73	31.18	34.53	34.29	29.49	42.78	27.73
HPC-2	6.90	10.17	24.94	59.68	15.39	36.56	38.29	25.15
HPC-3	6.51	10.75	26.37	55.74	17.89	28.48	48.44	23.08
HPC-4	10.23	14.04	33.45	31.86	34.69	22.13	48.01	29.86
HPC-5	5.10	10.51	21.95	32.55	45.50	30.07	41.42	28.51
HPC-6	2.39	12.64	26.18	59.71	14.11	38.97	38.13	22.90

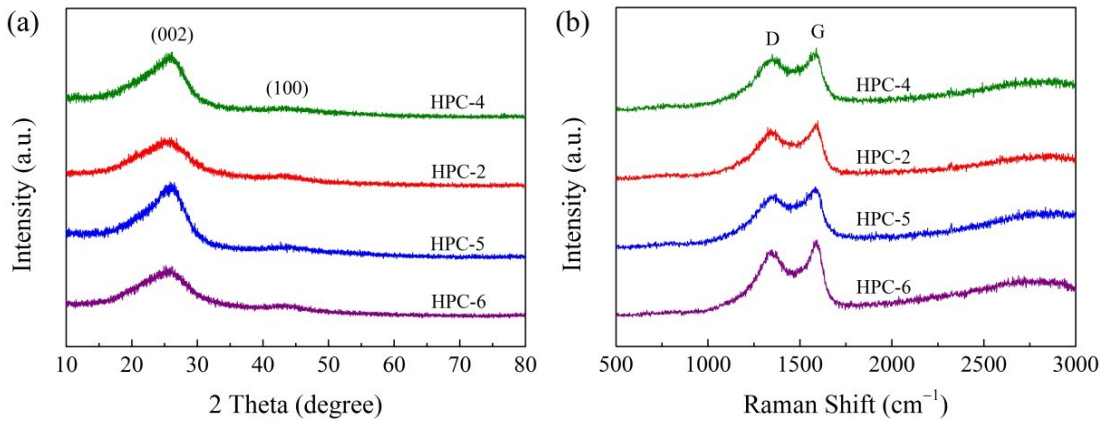

Fig. S4 XRD patterns (a) and Raman spectra (b) of HPC.

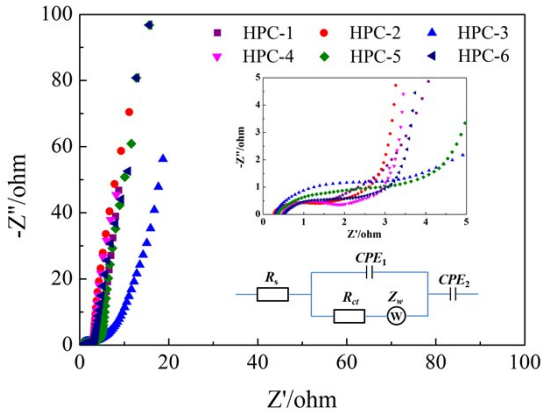

Fig. S5 Nyquist plots of HPC electrodes.

Table S3 Components of the equivalent circuit fitted for the impedance spectra.

Samples	R_s (Ω)	R_{ct} (Ω)	Z_w (Ω)
HPC-1	0.29	1.12	0.58
HPC-2	0.27	0.98	0.56
HPC-3	0.32	3.46	0.84
HPC-4	0.48	1.34	0.77
HPC-5	0.37	3.07	0.73
HPC-6	0.52	1.80	0.61

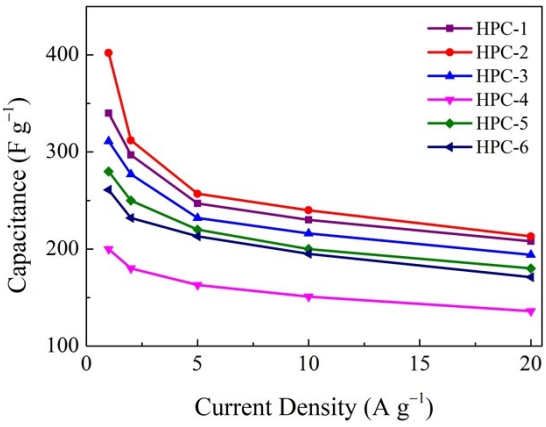

Fig. S6 Specific capacitances of HPC electrodes at different current densities.

Table S4 Comparison of surface areas (S_{BET}), heteroatom contents, specific capacitances (C_m) under different current densities (I_m) of reported heteroatom-doped carbon electrodes tested in a three-electrode system using 6 M KOH in the literatures.

Materials	S_{BET} ($m^2\ g^{-1}$)	N/O (wt.%)	C_m ($F\ g^{-1}$)	I_m ($A\ g^{-1}$)	Ref.
N-doped 3D graphene networks	583	15.8/6.93	380	0.6	1
N-doped graphene	–	4.2/14.5	312	0.1	2
Graphene nanocomposite	2416	2/–	176	0.5	3
3D binary-heteroatom doped carbon	1532	14.5/–	341	0.1	4
Porous carbon	3122	–/9.84	327	0.5	5
3D porous carbon	1874	5.11/–	404	0.1	6
2D carbons	594	4.04/–	233	1	7
N-doped graphdiyne	679	3.67/–	250	0.2	8
N-doped carbon nanofibers	418	7.85/5.35	307	1	9
Ultrathin porous carbon nanosheets	1192	–/10.6	233	1	10
N-doped carbon nanosheets	2494	4.7/–	242	0.1	11
N-doped carbons	329	13.44/–	374	0.1	12
HPC-2	2379	6.90/10.17	533	0.5	This
			402	1	work

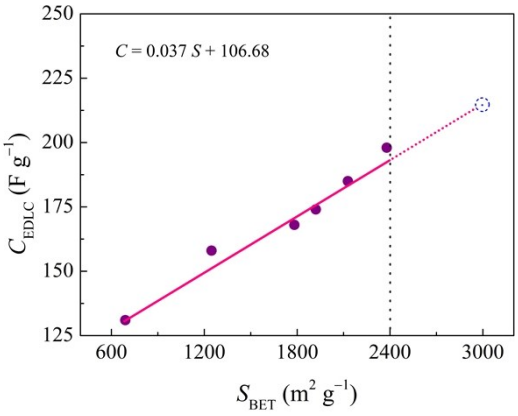

Fig. S7 The relationship between surface areas and C_{EDLC} of HPC electrodes.

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