Electronic Supplementary Material (ESI) for Energy & Environmental Science
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Electronic Supporting Information

Ionic liquid $C_{16}mimBF_4$ assisted synthesis of poly(benzoxazine-co-resol)-based hierarchical porous carbons with superior performance in supercapacitors

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Table S1 Relative surface concentrations of carbon species obtained by fitting the C1s core level XPS spectra

Sample	I 284.6 eV (C-C)	II 286.2 eV (C-OH&C-N)	III 288.2 eV (C=O)	IV 289.6 eV (COOH)	V 291.2 eV (carbonate)
CN	0.68	0.16	0.08	0.06	0.02
CNB-1	0.70	0.18	0.05	0.04	0.03
CNB-2	0.53	0.38	0.06	0.03	
CNB-3	0.68	0.24	0.08(288.92eV)		
CNB-4	0.61	0.30	0.06	0.03	

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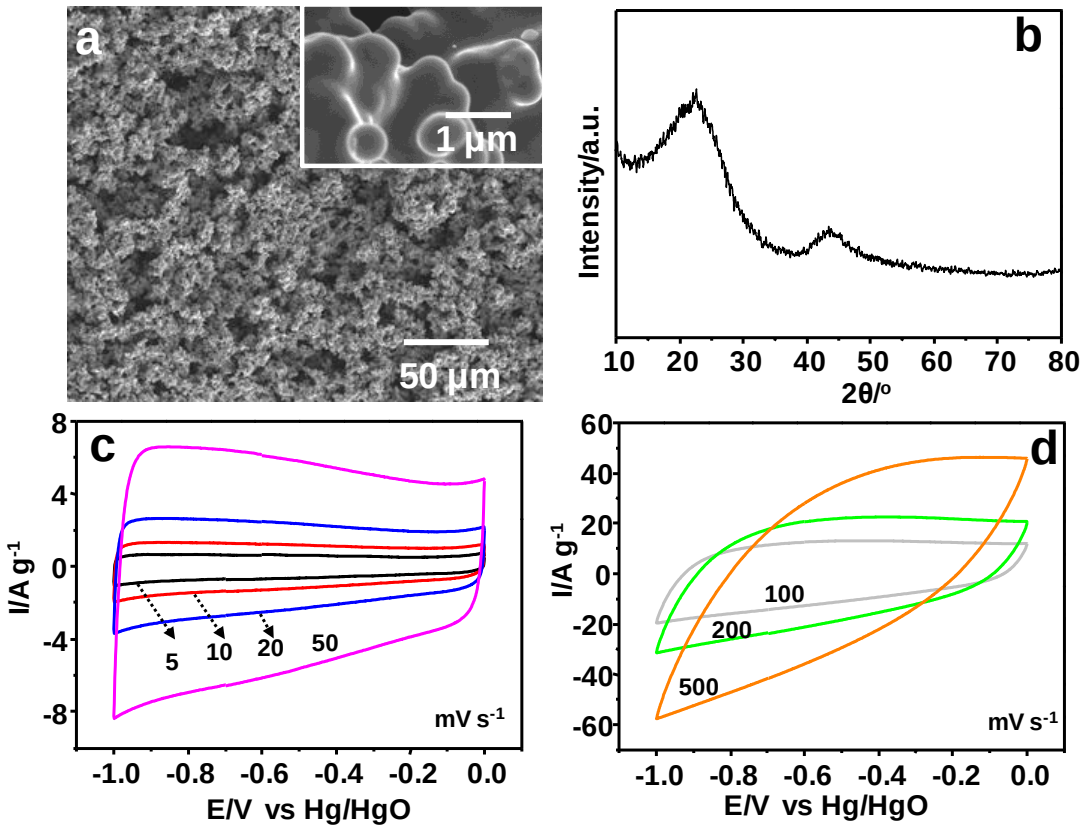

Fig. S1 SEM image of CN(a), and the XRD pattern(b). The rate capability of CN tested in a three electrode system at different scan rates (Fig. S1 c,d).

From the Fig.S1 a, we can see the sponge-like carbon framework of CN, similar with that of CNB-n (n=1 ~ 4). As seen from the inset image, the carbon framework of CN lacks of big mesopores and macropores with sizes ranging from 10 to 200 nm (see Fig 2). As shown in Fig.S1 b, the XRD pattern of sample CN also exhibits some level of graphitic structure. When using CN as the electrode, it can maintain similar rectangular shape at low scan rates (5 to 50 mV s^{-1}). In contrast, at high scan rates of 100 to 500 mV s^{-1}(Fig S1 c,d), the CV curves deviates from rectangular shape. And the specific capacitance of 182 F g^{-1} rapidly drops to 103 F g^{-1} corresponding with the current density increases from 0.5 A g^{-1} to 20 A g^{-1}. Such rate capability of CN is attributed to the lack of both the big pores which facilitate electrolyte transmission and heteroatoms doped carbon surfaces which increase the wettability of the surface and electrolyte, as compared with sample CNB-3.

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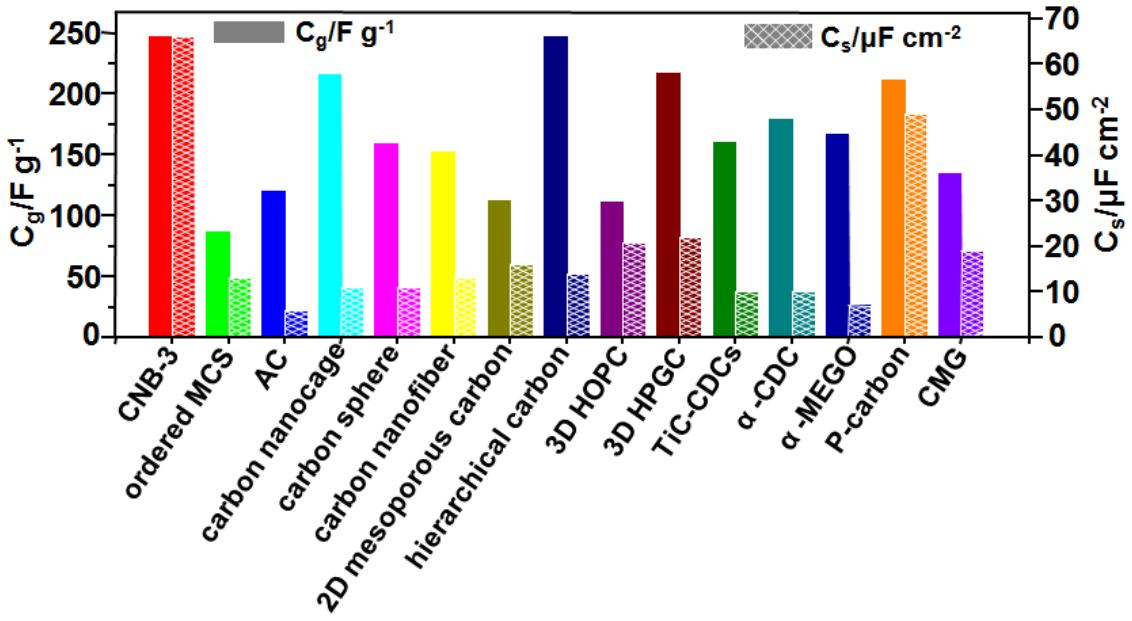

Fig. S2 The gravimetric and volumetric capacitance of CNB-3 in this work compared with that of other carbonaceous materials including: ordered mesoporous carbon sphere (ordered MCS),[1] active carbon (AC),[1] carbon nanocage,[2] mesporous carbon sphere,[3] carbon nanofiber arrays,[4] 2D ordered mesoporous carbon,[5] hierarchical porous carbon,[6] 3D hierarchically ordered porous carbon(3D HOPC),[7] 3D aperiodic hierarchical porous graphitic carbon (3D HPGC),[8] carbide-derived carbon (TiC-CDCs),[9] Chemical activation of CDC,[10] activated microwave exfoliated GO by KOH (α-MEGO),[11] phosphorus-enriched carbon (P-carbon),[12] chemically modified graphene (CMG).[13] The detailed experimental conditions of the samples used for comparison are listed in Table S2.

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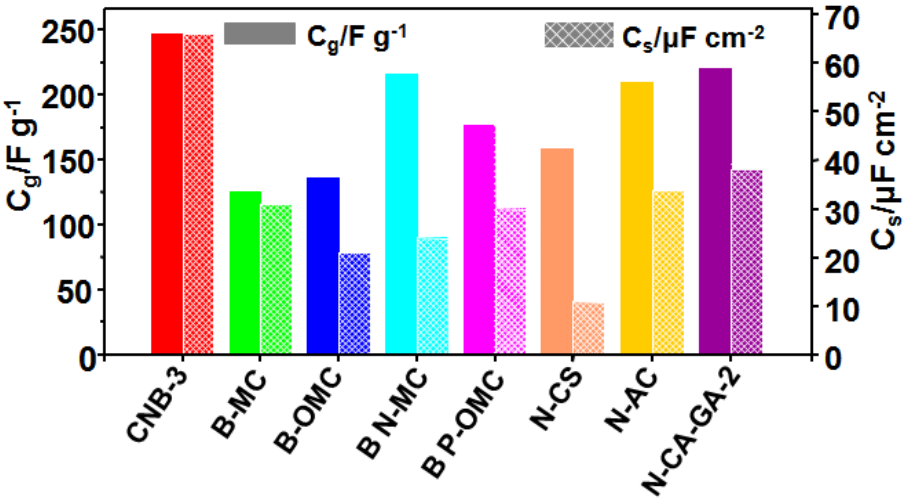

Fig. S3 The gravimetric and volumetric capacitance of CNB-3 compared with that of B or N doped carbonaceous materials including B-doped mesoporous carbon (B-MC),[14] B-doped ordered mesoporous carbon (B-OMC),[5] boron and nitrogen co-doped porous carbon (B-, N-MC),[15] B, P modified ordered mesoporous carbon (B-, P-OMC),[16] N-containing carbon spheres (N-CS),[3] N-microporous activated carbon (N-AC),[17] N-containing hydrothermal carbon (N-CA-GA-2).[18] The detailed experimental conditions of the samples used for comparison are listed in Table S3.

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Table S2 Typical results of nanocarbon and carbon-containing composite materials for supercapacitors in literatures

Sample	Gravimetric capacitance ($F\ g^{-1}$)	Interfacial capacitance ($\mu F\ cm^{-2}$)	Volumetric capacitance ($F\ cm^{-3}$)	System voltage(V)	Scan rate	Electrolyte	System [a]	Ref.
our sample (CNB-3)	247	66	101	-1 - 0.	0.5 A g^{-1}	6 M KOH	3/GC	-
mesoporous carbon sphere arrays (MCSA)	83	14	-	0 - 3	5 mV s^{-1}	1 M $(C_2H_5)_4NBF_4$/PC	2/CV	1
AC	127	6	-	0 - 3	5 mV s^{-1}	1 M $(C_2H_5)_4NBF_4$/PC	2/CV	1
carbon nano-cages (CNCs-700)	214	11*	-	0 - 0.8	1 A g^{-1}	1 M H_2SO_4	3/GC	2
mesoporous carbon spheres (MCS)	159	11*	-	0 - 2.5	0.5 A g^{-1}	1 M $LiPF_6$ in EC/DMC (EC:DMC =1)	3/GC	3
carbon nanofiber arrays (MCNAs)	152	13	-	0 - 3	200 mV s^{-1}	1 M $(C_2H_5)_4NBF_4$/PC	2/CV	4
heteroatom-incorporated 2D ordered mesoporous carbons (OMCs)	112*	16	-	0 - 0.8	0.2 A g^{-1}	6 M KOH	3/GC	5
hierarchical porous carbon (HPC)	247	14*	-	-1 - 0.2	5 mV s^{-1}	6 M KOH	3/CV	6

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3D, hierarchically ordered, porous carbons(HOPC-800)	109	20	-	0 - 1	1 A g^{-1}	No record	3/CV	7
3D aperiodic hierarchical porous graphitic carbon (HPGC)	217	22*	-	0 - 1	0.5 A g^{-1}	6 M KOH	3/GC	8
TiC-CDCs carbide derived carbon (CDC)	160	10	85	0 - 3	20 mV s^{-1}	1-Ethyl-3-methylimidazolium bis(trifluoromethanesulfonyl)	2/CV	9
chemical activation of CDC	179	10*	118	0 - 2.3	20 mA g^{-1}	NEt_4BF_4 salt dissolved in acetonitrile	GC	10
microwave exfoliated GO (MEGO) and activated MEGO (a-MEGO) by KOH	165	7*	60	0 - 3.5	1.4 A g^{-1}	1-butyl-3-methyl-imidazolium tetrafluoroborate /AN	2/GC	11
SC-P (Phosphorus-enriched carbons)	212	49*	-	0 - 1.3	1 A g^{-1}	1 M H_2SO_4	2/GC	12
chemically modified graphene (CMG)	135	19*	-	0 - 1	10 mA g^{-1}	6 M KOH	2/GC	13

a: The numbers 2 and 3 refer to two- and three-electrode tests, respectively.

*: The value are calculated from the information that given in the reference.

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Table S3 Typical results of boron or nitrogen doped nanocarbon materials for supercapacitors in literatures.

Sample	Gravimetric capacitance ($F\ g^{-1}$)	Interfacial capacitance ($\mu F\ cm^{-2}$)	B cotent wt %	N cotent wt %	System voltage(V)	Scan rate	Electrolyte	System[a]	Ref.
our sample (CNB-3)	247	66	0.66	0.53	-1 - 0	0.5 A g^{-1}	6 M KOH	3/GC	-
boron-doped mesoporous carbon (BMC-ii)	125	27	0.16	-	-0.8 - 0	2.0 mV s^{-1}	6 M KOH	3/CV	14
heteroatom-incorporated ordered mesoporous carbon (B0.7-OMC)	136*	21	0.56	-	0 - 0.8	0.2 A g^{-1}	6 M KOH	3/GC	5
boron and nitrogen co-doped porous carbon (BNC-9)	216	24	8.7 at.%	7.1	-0.9 - -0.1	0.5 A g^{-1}	6 M KOH	3/GC	15
dual-heteroatom-modified ordered mesoporous carbon (HTBP150)	177	30	1.2	-	-1.0 - 0	5.0 mV s^{-1}	6 M KOH	3/CV	16
nitrogen-containing carbon spheres	159	11*	-	6	1.5 - 4	0.5 A g^{-1}	1 M $LiPF_6$ in EC/DMC	3/GC	3
N-microporous activated carbon (S-M)	210	28*	-	4	0 - 1.0	0.5 A g^{-1}	1 M H_2SO_4	3/GC	17
chemical activated glucosamine (CA-GA-2)	220	38	-	4.4	-0.8 - 0	0.1 A g^{-1}	6 M KOH	3/GC	18

a: The numbers 2 and 3 refer to two- and three-electrode tests, respectively.

*: The value are calculated from the information that given in the reference.

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