Electric Supplementary Information

A universal KOH-free strategy towards nitrogen-doped carbon nanosheets for high rate and high energy storage

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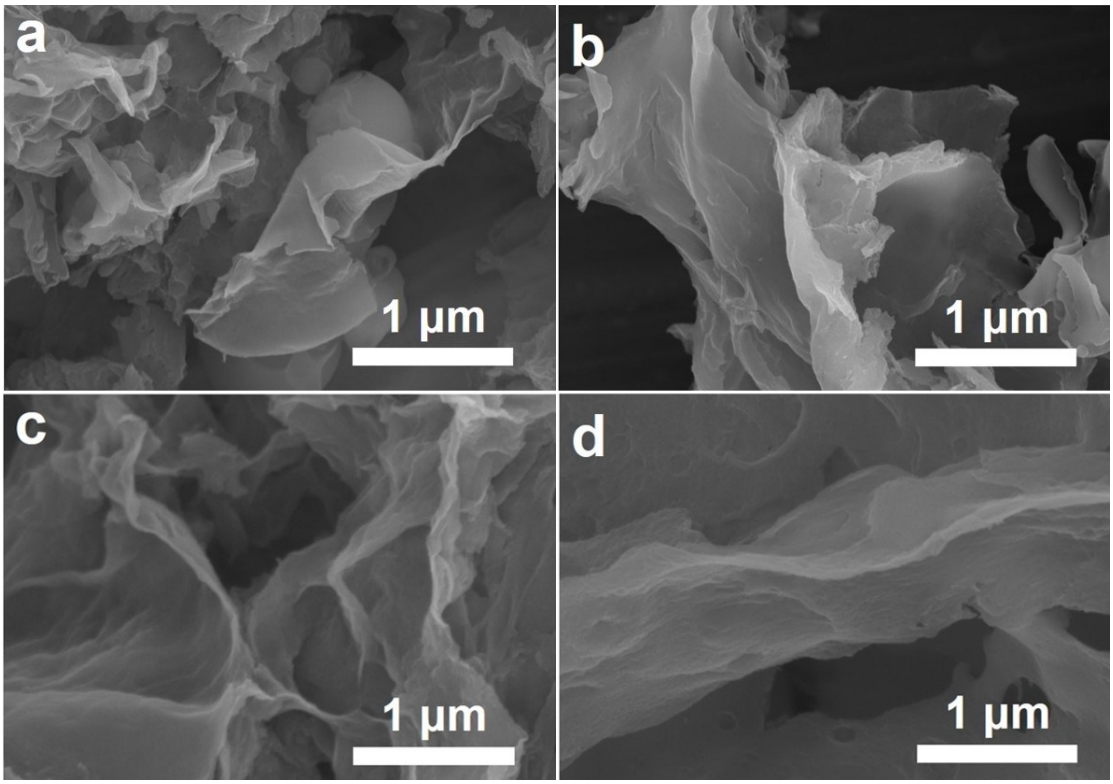

Fig. S1. The high-resolution SEM images of (a) N-CNS, (b) N-SCNS-1, (c) N-SCNS-3, (d) N-SCNS-5.

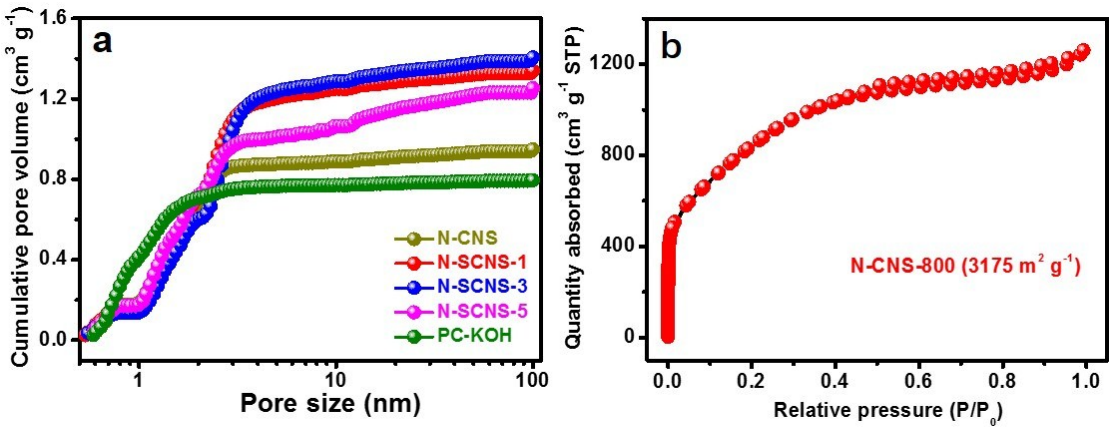

Fig. S2. (a) The cumulative pore volume plots of N-CNS, N-SCNSs and PC-KOH. (b) The N_2 adsorption/desorption isotherms of N-CNS-800.

Table S1. The detailed element content of C, N, and O, and the content of different N-dopants

Samples	C_{total} (%)	O_{total} (%)	N_{total} (%)	N-5/N_{total}	N-6/N_{total}	N-Q/N_{total}
N-CNS	84.29	10.95	4.76	0.315	0.425	0.26
N-SCNS-1	87.88	7.16	4.96	0.38	0.46	0.16
N-SCNS-3	88.48	7.14	4.38	0.23	0.54	0.23
N-SCNS-5	90.38	6.66	2.96	0.21	0.58	0.21
SCNS-1	91.18	6.29	2.53	0.2	0.6	0.2
PC-KOH	89.64	8.70	1.66	0.35	0.45	0.2

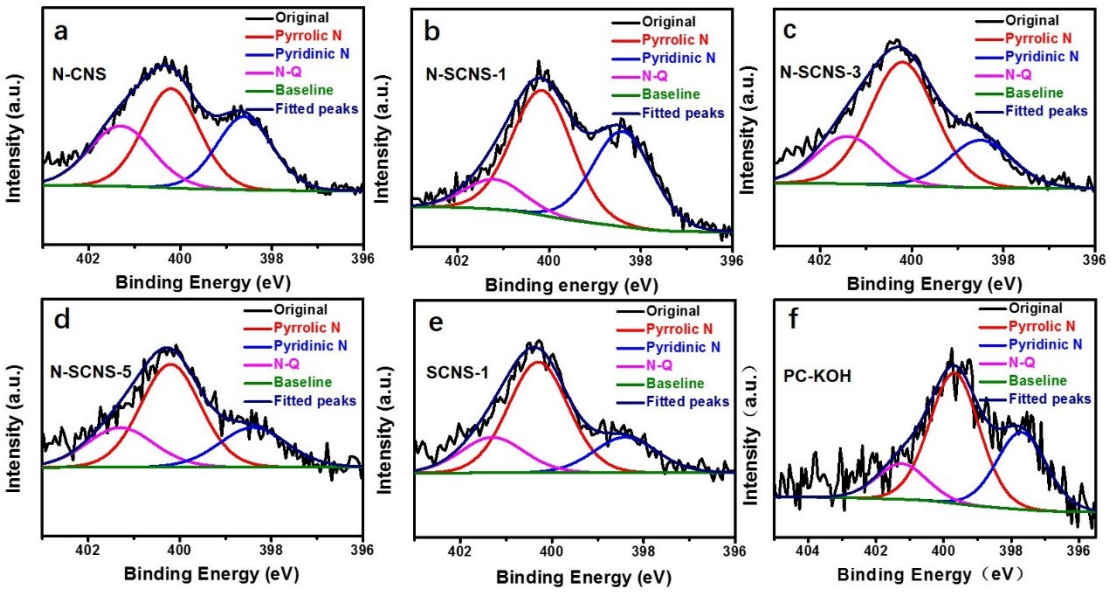

Fig. S3. The high-resolution N 1s XPS spectra of N-CNS, N-SCNSs, SCNS-1, and PC-KOH.

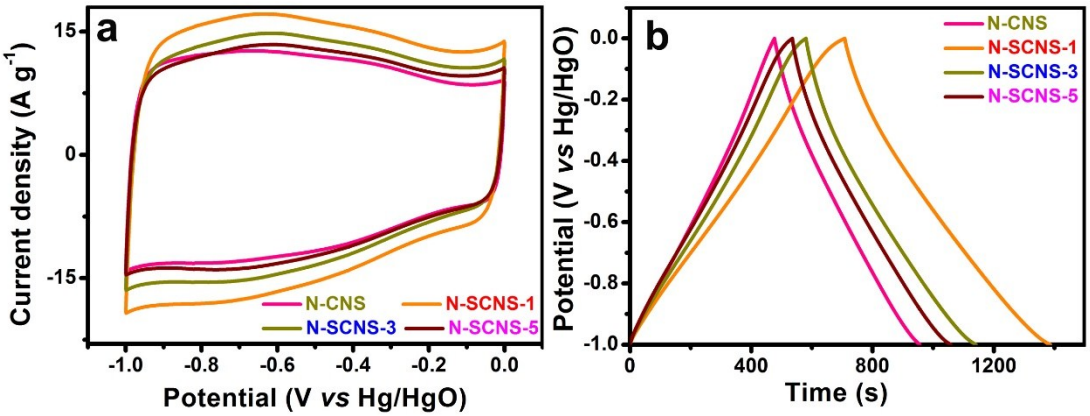

Fig. S4. (a) The CV curves of N-CNS and N-SCNSs at a scan rate of 50 mV s^{-1}. (b) The GCD plots of N-CNS and N-SCNSs at a current density of 0.5 A g^{-1}.

Table S2. The comparison of specific capacitance and cycling performance for N-SCNS-1 with reported carbon materials in three-electrode system

Materials	Activator	Electrolyte	Specific capacitance ($F\ g^{-1}$)	Specific capacitance ($F\ g^{-1}$)	Cycling performance	Reference
Porous carbons	KOH	6 M KOH	286.6 (0.5 A g^{-1})	212 (30 A g^{-1})	96% after 20 000 cycles	R1
Hierarchical porous carbons	KOH	6 M KOH	379 (0.5 A g^{-1})	200 (50 A g^{-1})	90% after 20 000 cycles	R2
Porous carbons	$CuCl_2$	6 M KOH	390 (0.5 A g^{-1})	260 (50 A g^{-1})	92.9% after 20 000 cycles	R3
porous carbon sheets	NaCl/KCl	1 M H_2SO_4	407 (0.5 A g^{-1})	246 (20 A g^{-1})	92.6% after 20 000 cycles	R4
Porous carbons	$ZnCl_2$	6 M KOH	252 (0.5 A g^{-1})	145 (50 A g^{-1})	100% after 10 000 cycles	R5
Porous graphitic carbons	K_2FeO_4	6 M KOH	222 (0.5 A g^{-1})	115 (20 A g^{-1})	———	R6
Graphene-like carbons	HAc+H_2O_2	6 M KOH	340 (0.5 A g^{-1})	240 (20 A g^{-1})	98% after 10 000 cycles	R7
Hierarchical porous carbons	Pyrolysis	6 M KOH	244.5 (0.2 A g^{-1})	200 (40 A g^{-1})	91.6% after 10 000 cycles	R8
Porous carbons	KOH/Urea	6 M KOH	400 (0.5 A g^{-1})	226 (50 A g^{-1})	96% after 10 000 cycles	R9
carbon nanospheres	KOH	6 M KOH	264 (0.5 A g^{-1})	205 (20 A g^{-1})	96.1% after 10 000 cycles	R10
Porous carbons	KOH	6 M KOH	255 (0.5 A g^{-1})	205 (10 A g^{-1})	98% after 10 000 cycles	R11
Porous carbons	KOH	6 M KOH	401 (0.5 A g^{-1})	210 (50 A g^{-1})	93.8% after 10 000 cycles	R12
Graphene-like carbons	KOH	6 M KOH	374 (0.5 A g^{-1})	293 (5 A g^{-1})	99% after 10 000 cycles	R13
Nitrogen-doped carbon nanosheets	POM/DCD	6 M KOH	340 (0.5 A g^{-1})	282 (50 A g^{-1})	100% after 20 000 cycles	**This Work**

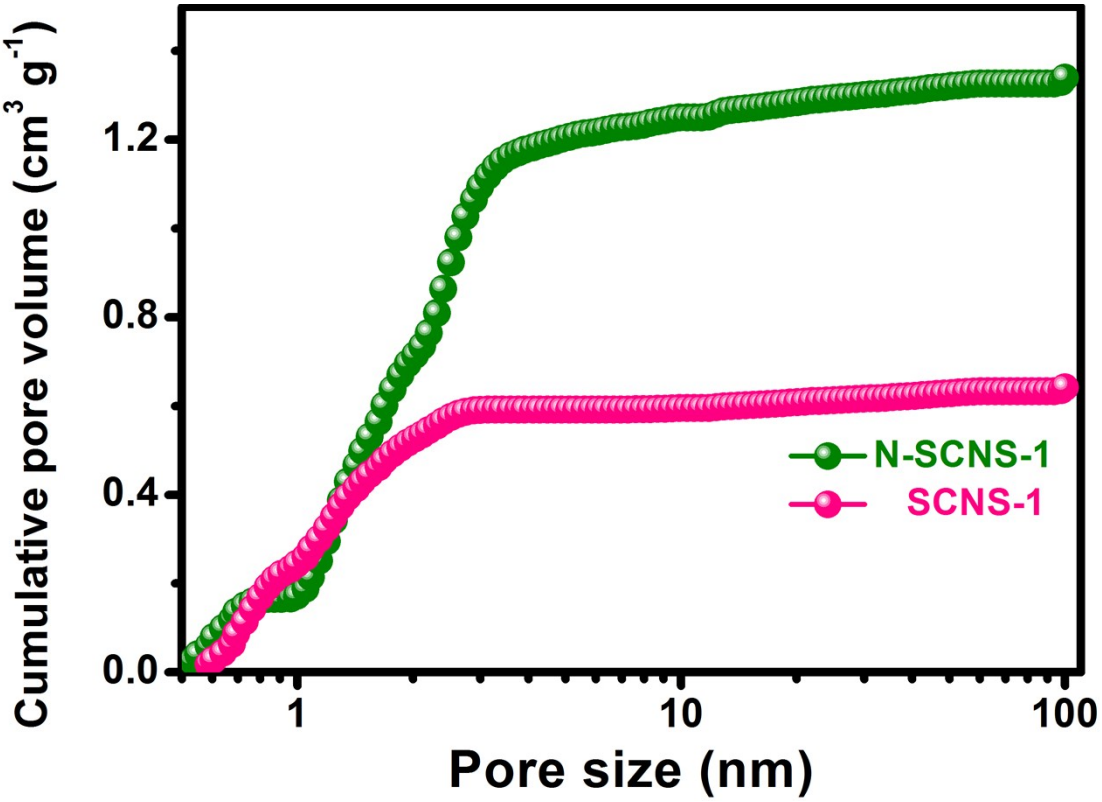

Fig. S5. The cumulative pore volume plots of SCNS and N-SCNS-1.

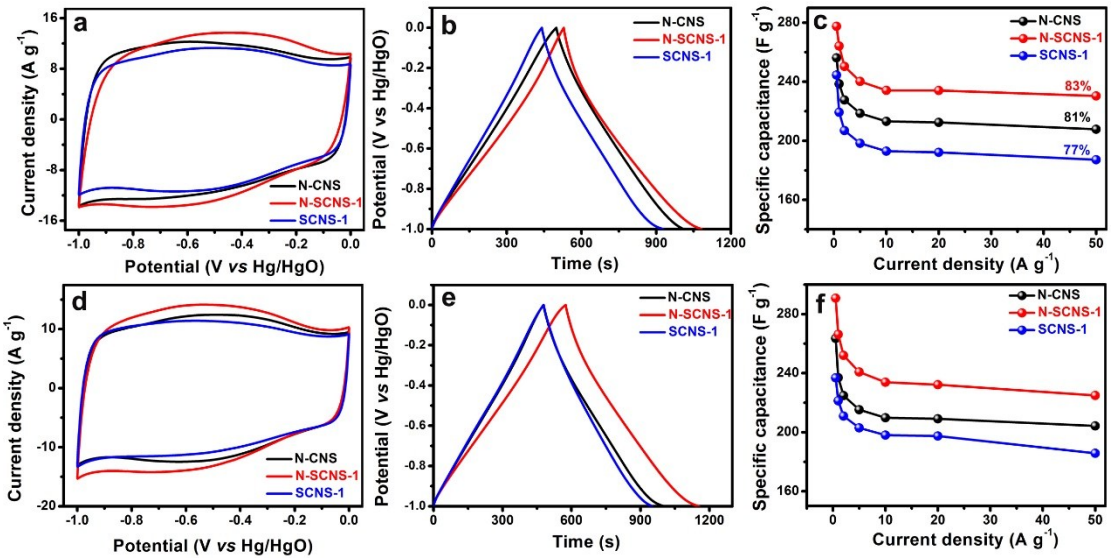

Fig. S6. The electrochemical performance of porous carbons derived from rapeseed dregs (a, b, c) and soybean meal (d, e, f) in three-electrode system with 6.0 M KOH as electrolyte. (a, d) The CV curves of N-CNS, N-SCNS-1, and SCNS-1 at a scan rate of 50 mV s^{-1}. (b, e) The GCD plots of N-CNS, N-SCNS-1, SCNS-1 at a current density of 0.5 A g^{-1}. (c, f) The rate capability of the as-prepared N-CNS, N-SCNS-1, and SCNS-1.

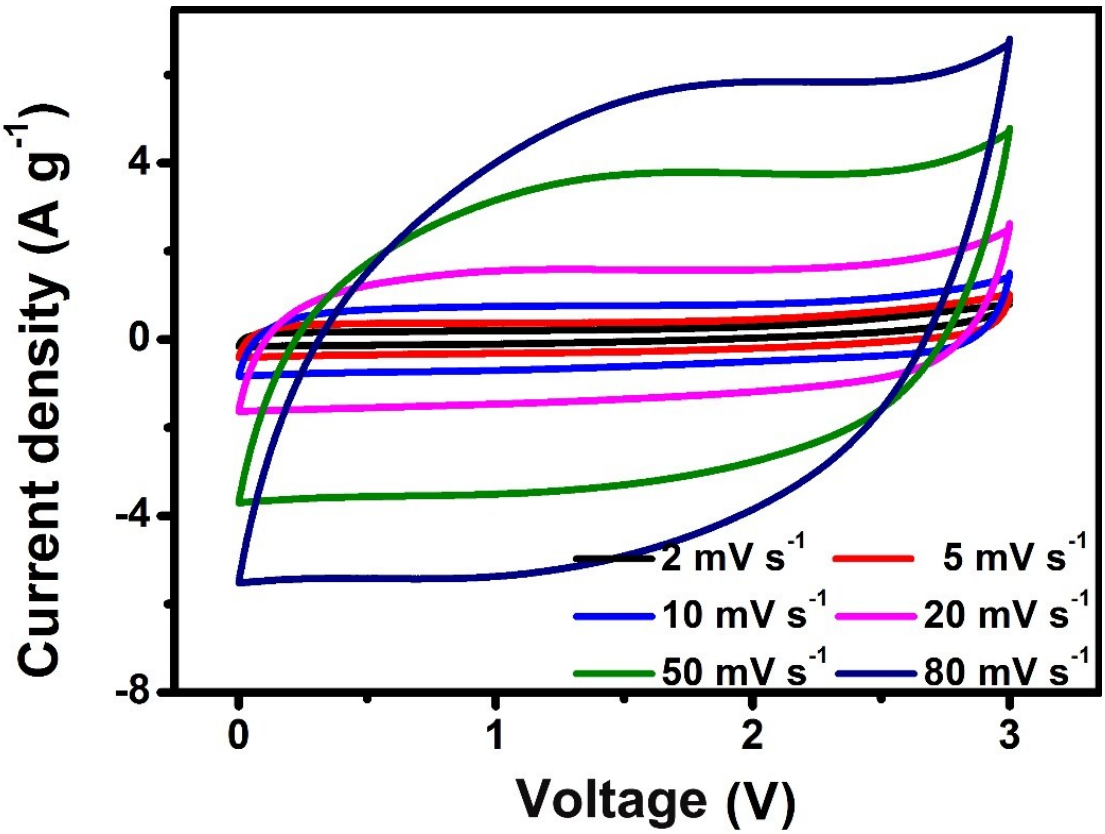

Fig. S7. The CV curves of N-SCNS-1 with 1.0 M $LiPF_6$ electrolyte solution in two-electrode system.

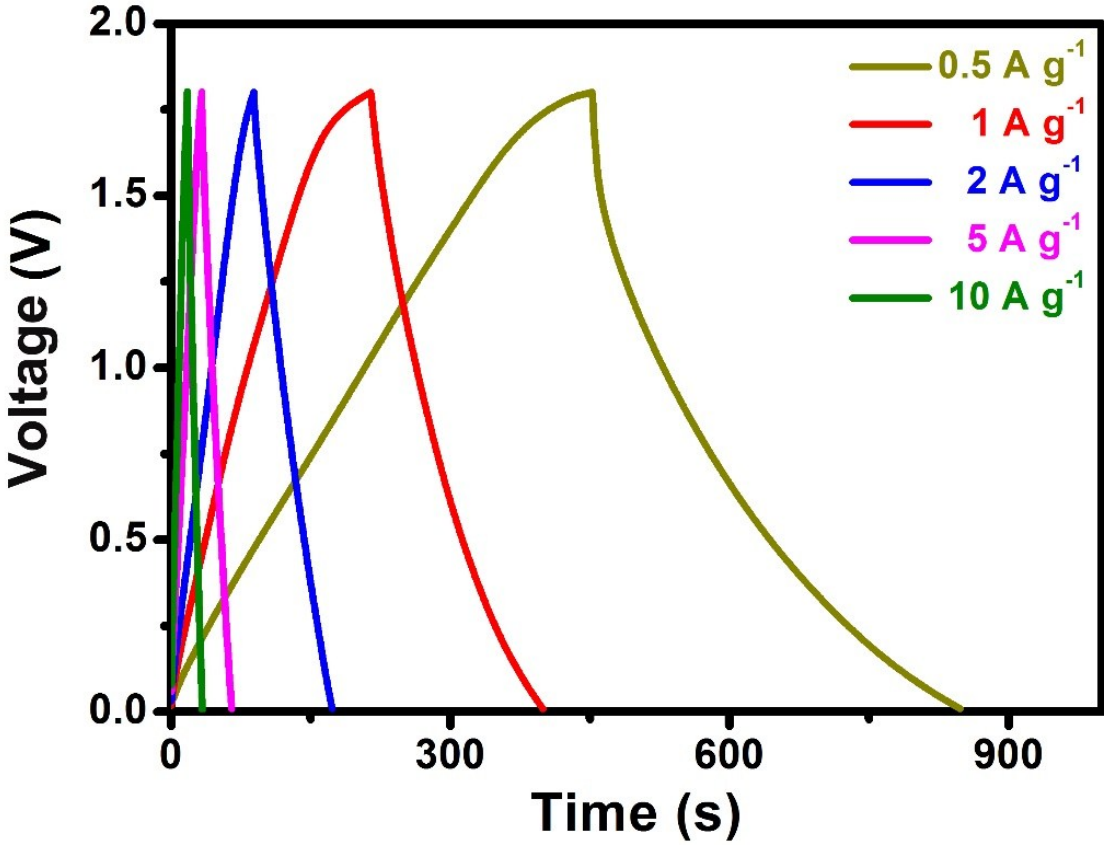

Fig. S8. The GCD plots of N-SCNS-1 with 1.0 M Na_2SO_4 electrolyte solution in two-electrode system.

Table S3. The comparison of energy density for N-SCNS-1 with previously reported carbon materials in two-electrode system

Materials	Energy density (Wh kg^{-1})	Power density (W kg^{-1})	Electrolyte	References
Carbon nanosheets	23. 7	500	1 M Na_2SO_4	R12
Porous carbons	22	90	1 M Na_2SO_4	R13
Porous carbon aerogels	16.97	200	1 M Na_2SO_4	R14
Hierarchical porous carbons	20.6	226.8	1 M Na_2SO_4	R15
Porous carbons	24.2	400	1 M Na_2SO_4	R16
Carbon nanosheets	21.5	456.5	1 M Na_2SO_4	R17
Porous carbons	21	180	1 M Na_2SO_4	R18
Porous carbon nanofibers	30	65	1 M $LiPF_6$	R19
Porous carbons	44.6	300	1 M $LiPF_6$	R20
Carbon nanoflakes	46.19	300	1 M $LiPF_6$	R21
Meso-carbon materials	25	700	1 M $LiPF_6$	R22
Nitrogen-doped carbon nanosheets	24.1 55.5	220 369	1 M Na_2SO_4 1 M $LiPF_6$	**This Work**

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