Supplementary Information

Electrochemical performance of potassium hydroxide and ammonia activated porous nitrogen-doped carbon in sodium-ion batteries and supercapacitors

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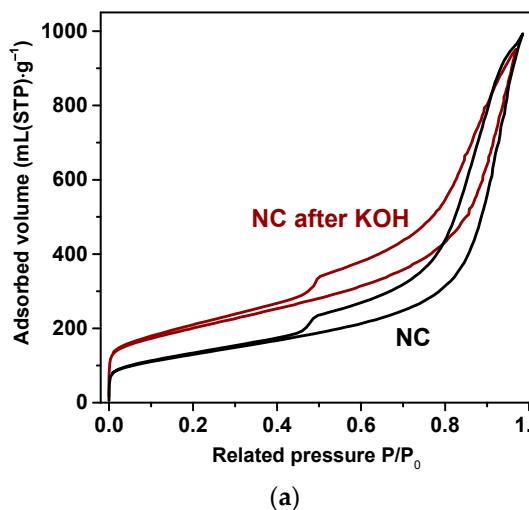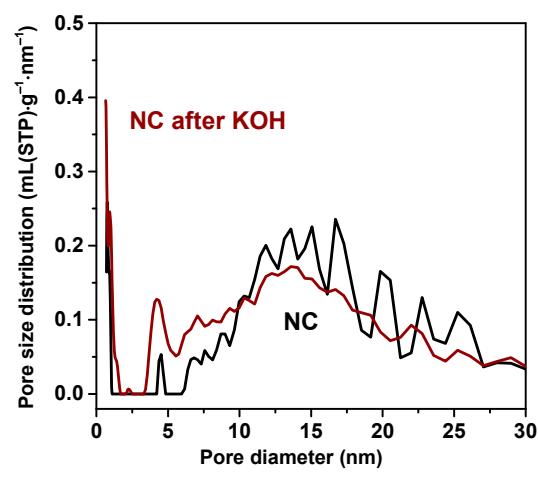
Figure S1. (**a**) Nitrogen adsorption-desorption isotherms at 77 K and (**b**) DFT pore size distributions of NC and NC after the treatment with potassium hydroxide.
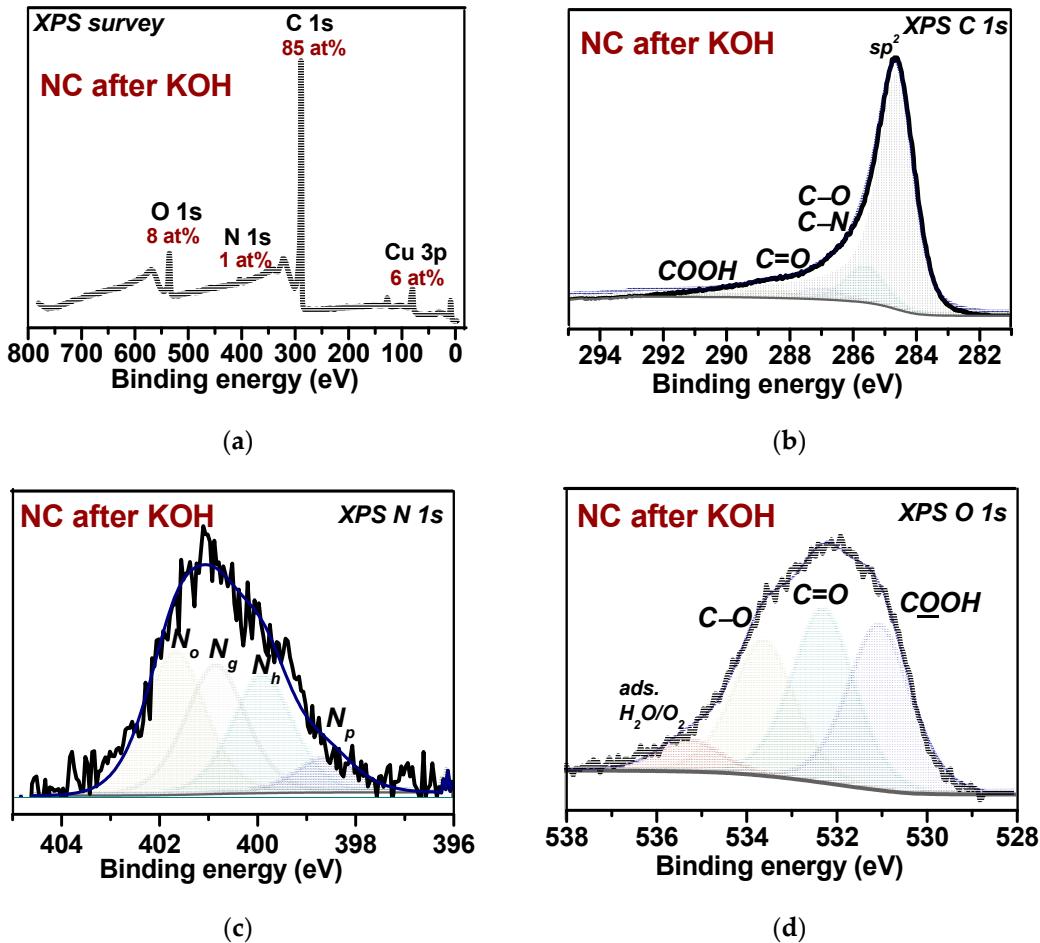
Figure S2. XPS (**a**) survey, (**b**) C 1s, (**c**) N 1s and (**d**) O 1s spectra of NC after the treatment with potassium hydroxide.
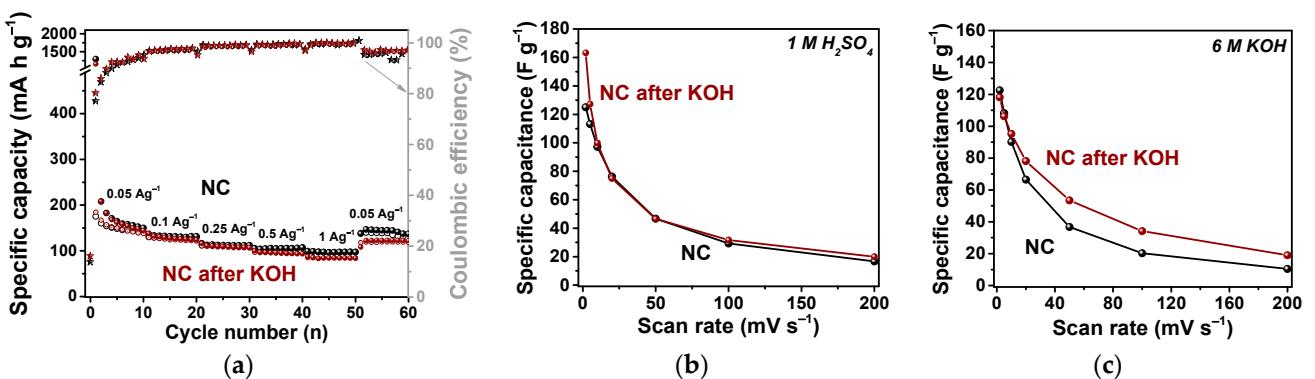
Figure S3. (**a**) Rate capability of NC and NC after KOH-treatment electrodes at current densities of 0.05–1.00 A·g⁻¹ in SIB cell; gravimetric capacitance of NC and NC after KOH-treatment at scan rates of 2–200 mV·s⁻¹ in (**b**) 1 M H₂SO₄ and (**c**) 1 M KOH electrolytes in supercapacitors.

Table S1. Capacitance in aqueous supercapacitors (SCs) in 1 M H_2SO_4 and 6 M KOH electrolytes and capacity in sodium-ion batteries (SIB) for nitrogen-doped carbon materials are reported in the literature

Material	Nitrogen concentration	Specific surface area	Capacitance in aqueous SCs or SIB capacity
SCs in 1 M H_2SO_4 electrolyte			
activated carbon[1]	2 wt.%	2062 m^2g^{-1}	358 Fg^{-1} at 0.5 mV s^{-1}
nitrogen-doped porous carbon[2]	3.3 wt.%	1463 m^2g^{-1}	282 Fg^{-1} at 2 mV s^{-1} 148 Fg^{-1} at 100 mV s^{-1}
mica templated carbon[3]	10 wt.%	87.5 m^2g^{-1}	105 Fg^{-1} at 1 mV s^-
MOF-templated porous carbon[4]	5.3 wt.%	822 m^2g^{-1}	72 Fg^{-1} at 5 mV s^{-1}
	5.2 wt.%	586 m^2g^{-1}	37 Fg^{-1} at 5 mV s^{-1}
N-doped reduced graphene oxide[5]	3 at.%	355 m^2g^{-1}	220 Fg^{-1} at 25 mV s^{-1}
porous carbon nanosheets[6]	12.7 at.%	410 m^2g^{-1}	305 Fg^{-1} at 2 mV s^{-1}
activated carbon[7]	5.5 at.%	657 m^2g^{-1}	200 Fg^{-1} at 10 mV s^{-1}
SCs in 6 M KOH electrolyte			
nitrogen-containing carbon nanotubes[8]	6.1 wt.%	-	160 Fg^{-1} at 50 mV s^{-1}
nitrogen-doped carbon nanoparticles[9]	10.5 wt.%	365 m^2g^{-1}	156 Fg^{-1} at 2 mV s^{-1} 80 Fg^{-1} at 100 mV s^{-1}
nitrogen-doped carbon microfibers[10]	4.5 wt.%	230 m^2g^{-1}	189 Fg^{-1} at 5 mV s^{-1}

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nitrogen-containing mesoporous carbon[11]	8.4 wt.%	930 m²g⁻¹	230 Fg⁻¹ at 5 mV s⁻¹ 215 Fg⁻¹ at 100 mV s⁻¹
nitrogen-doped hierarchically porous carbon material[12]	6.3 at.%	1091 m²g⁻¹	187 Fg⁻¹ at 5 mV s⁻¹
SIBs			
N-rich carbon nanosheets[13]	12 at.%	352 m²g⁻¹	185 mAhg⁻¹ at 0.1 Ag⁻¹
N-doped nano-sized carbon spheres[14]	9.12 at.%	604 m²g⁻¹	245 mAhg⁻¹ at 0.03 Ag⁻¹
N-doped amorphous carbon nanofibers[15]	7.29 at.%	370 m²g⁻¹	321 mA h g⁻¹ at 0.05 Ag⁻¹
N-doped carbon/graphene[16]	7.54 at.%	94 m²g⁻¹	303 mAhg⁻¹ at 0.05 Ag⁻¹ 274 mAhg⁻¹ at 0.1 Ag⁻¹ 94 mAhg⁻¹ at 5 Ag⁻¹
N-rich hollow carbon-onion-constructed nanosheets[17]	16.54 at.%	108 m²g⁻¹	262 mAhg⁻¹ at 0.1 Ag⁻¹ 151 mAhg⁻¹ at 5 Ag⁻¹
N-doped porous carbon nanofibers[18]	-	138 m²g⁻¹	174 mAhg⁻¹ at 0.05 Ag⁻¹ 156 mAhg⁻¹ at 0.1 Ag⁻¹
N-doped carbon fiber aerogels[19]	12.2 at.%	65 m²g⁻¹	~170 mAhg⁻¹ at 0.1 Ag⁻¹ ~140 mAhg⁻¹ at 1 Ag⁻¹
N-doped carbon nanobubbles[20]	11.6 at.%	672 m²g⁻¹	248 mAhg⁻¹ at 0.3 Ag⁻¹
N-doped carbon nanotubes[21]	5 at.%	737 m²g⁻¹	185 mAhg⁻¹ at 0.1 Ag⁻¹ 153 mAhg⁻¹ at 1 Ag⁻¹

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N-doped double-shell hollow carbon sphere[22]	-	674 m^{2}g^{-1}	250 mAhg^{-1} at 0.06 Ag^{-1} 137 mAhg^{-1} at 1.2 Ag^{-1}
N-doped carbon spheres[23]	-	-	152 mAhg^{-1} at 0.05 Ag^{-1} 83 mAhg^{-1} at 1 Ag^{-1}
hierarchically porous N-doped carbon[24]	2.1 wt.%	800 m^{2}g^{-1}	205 mAhg^{-1} at 0.1 Ag^{-1} 132 mAhg^{-1} at 1 Ag^{-1}

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