Supplementary data for

Rich sulfur doping porous carbon materials derived from ginkgo leaves for multiple electrochemical energy storage

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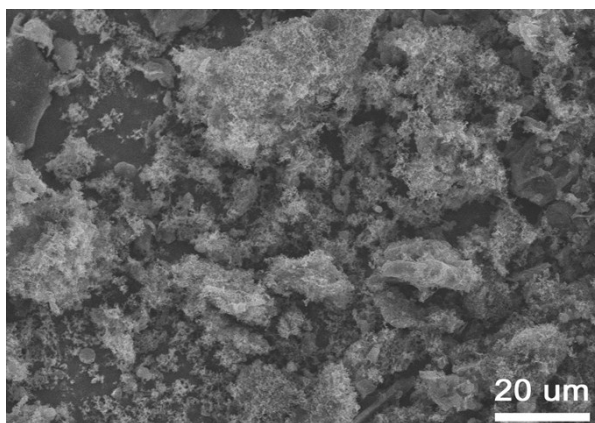
China

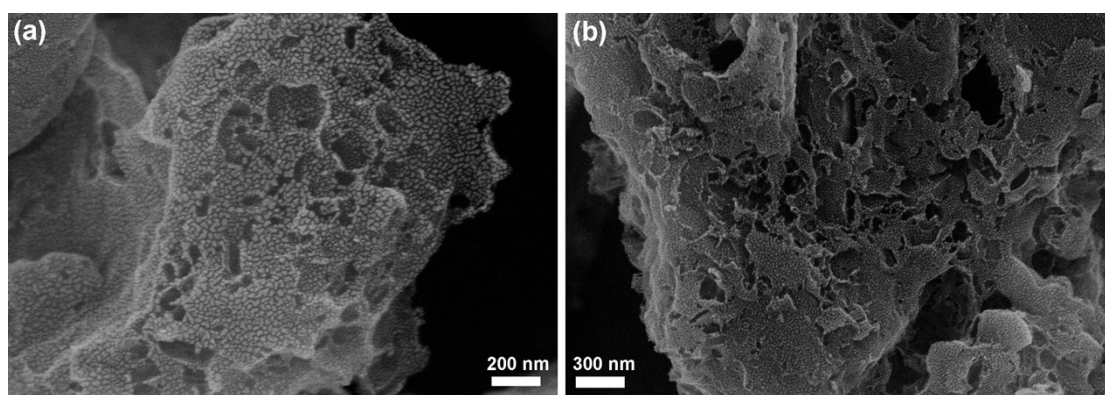Figure S1. SEM images of ACGL highlighting the homogeneous porous structure.

Figure S2. SEM images of lacking adequate KOH activation which gives rise to the incomplete exfoliation.
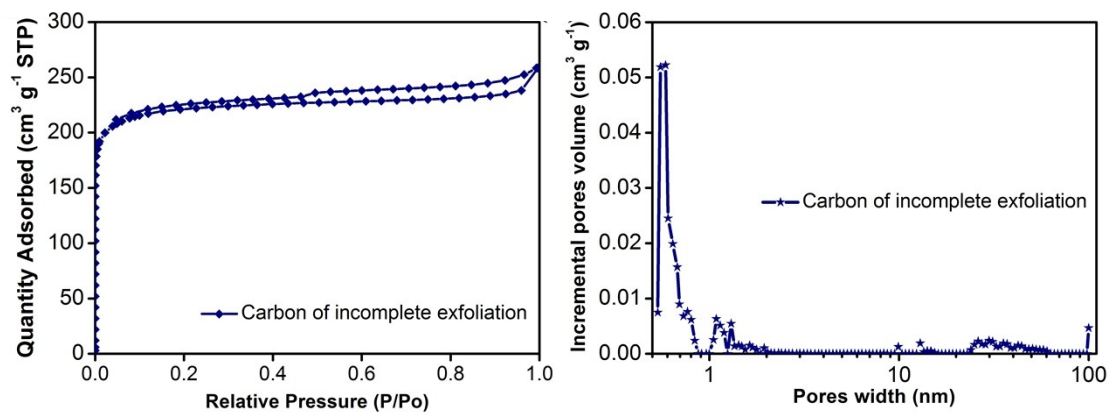

Figure S3. The N_2 adsorption–desorption isotherms and pore size distributions of the sample with lacking adequate KOH activation, showing the specific surface area of 863 $m^2\,g^{-1}$.
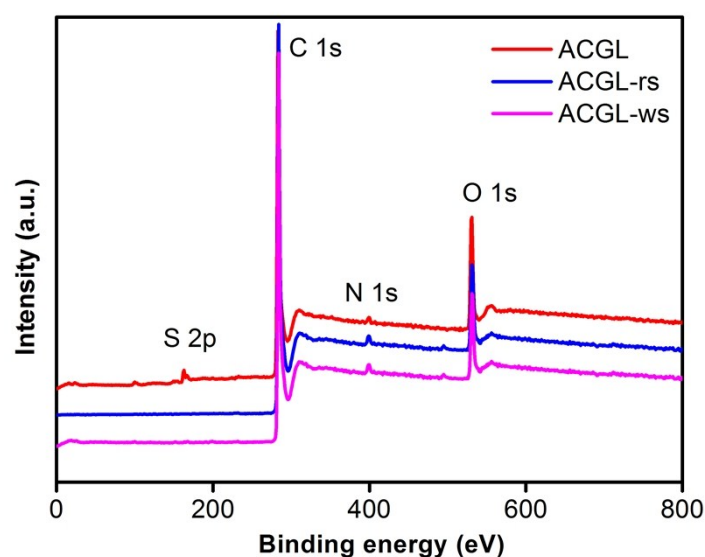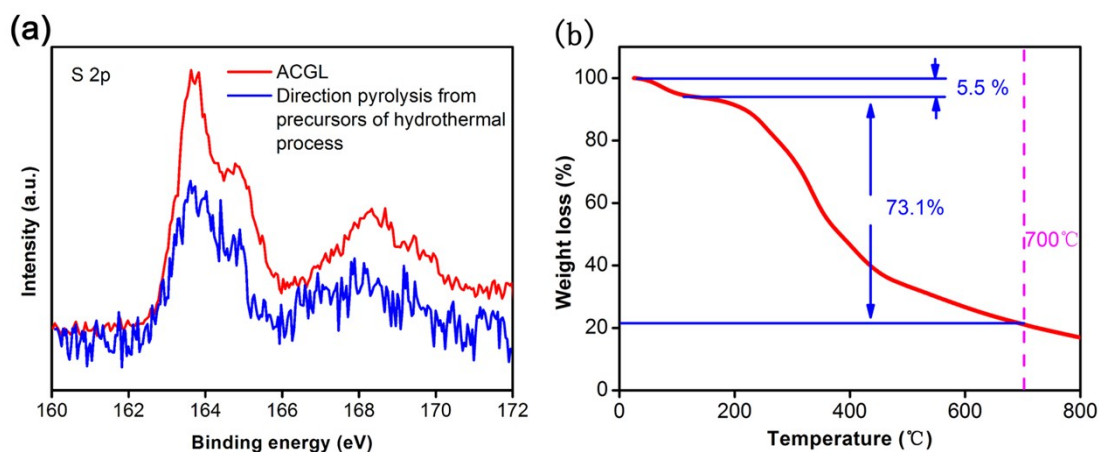
Figure S4. XPS survey of ACGL, ACGL-rs, and ACGL-ws.

Figure S5. (a)High resolution of S 2p XPS spectra of ACGL and the sample fabricated by the direction pyrolysis from precursors of hydrothermal process, and (b)TG curve of the sample fabricated by the direction pyrolysis from precursors of hydrothermal process in N_2.

The sample was prepared by the direction pyrolysis of precursors obtained from hydrothermal process, and its XPS result was displayed in Figure S4a. The content of S-atoms is 2.63%, which is seem to be less than ACGL. However, the sulfur content does not change actually but the increase of carbon amount of the sample in contrast to ACGL. As we all known, KOH activation in pyrolysis can consume lots of carbon by producing CO_2, which leads to the obvious decrease of the carbon content in ACGL. This can also be confirmed by the TG result of the precursors obtained from hydrothermal process. Therefore, it is reasonable that the sample without KOH activation shows the lower sulfur content than ACGL.
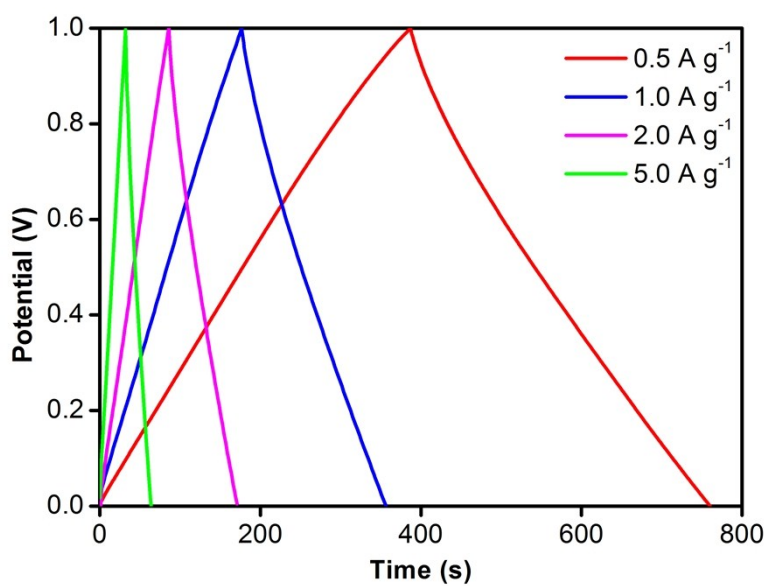
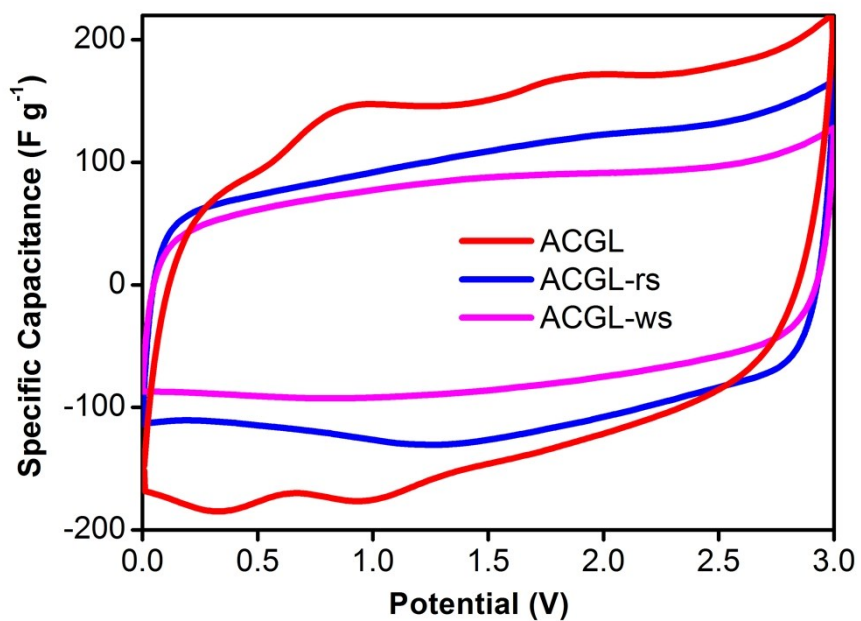Figure S6. GCD curve of ACGL at different current density.

Figure S7. CV curve of ACGL, ACGL-rs, and ACGL-ws at 50 mV s^{-1}.

Table S1 Comparison of electrochemical performance of recent reported carbons with N or P doping in KOH electrolyte.

Sample	N or P and content	Capacitance ($F\ g^{-1}$)	Capacitance retention	Ref.
SNOPC	N(1.1%),P(1.6%)	315 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	93.4 % after 2000 cycles/0.5A g^{-1}	1
CDMMC	N(4.0%)	363 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	97 % after 5000 cycles/0.5 $A\ g^{-1}$	2
N-CNS	N (5.9%)	239 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	96 % after 5000 cycles/6 $A\ g^{-1}$	3
NE-CNWs-700	N (16.57%)	220 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	92.4 % after 5000 cycles/20mV s^{-1}	4
P-PN-CNFs	N(4.4%),P(2.8%)	280 $F\ g^{-1}$ at 1 $A\ g^{-1}$	94% after 10000cycles/1 $A\ g^{-1}$	5
PAC7525	N(2.05%),P(1.16%)	227 $F\ g^{-1}$ at 0.05 $A\ g^{-1}$	93.8% after 3000 cycles/5 $A\ g^{-1}$	6
P-GNS	P (0.68%)	290 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	-	7
NPOMC-950	N(5.18%),P(3.42%)	327 $F\ g^{-1}$ at 0.5 $A\ g^{-1}$	100% after 1000cycles/-	8
ACGL	S(8.245%),N(0.56%)	350 $F\ g^{-1}$ at 1 $A\ g^{-1}$	98.1% after 30000 cycles/5A g^{-1}	This work

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