Supporting Information

Semi-coke-based amorphous porous carbon synthesized by molten salt assisted method for superior lithium storage

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Materials characterization

The crystal structure of the material was determined by X-ray diffraction measurements (XRD, Ultima IV-185, Rigaku) using Cu Kα radiation (λ = 0.15444 nm). Field emission scanning electron microscopy (SEM, S-4800, Hitachi, Japan) and high-resolution transmission electron microscopy (HRTEM, JEM-2100F, Japan) were used to characterize the surface morphology. A thermal analyzer (TG analysis, STDQ600, TA, USA) was carried out using the thermal gravimetric analysis at a heating rate of 10 ℃/min in air atmosphere. Bruker Senterra Spectrometer (532 nm) was used to measure the Raman spectra. The specific surface area and porosity of the samples were studied by N_2 physical adsorption-desorption isothermal method (ASAP 2460, Micromeritics, USA).

Electrochemical characterization

The preparation process of anode electrodes is as follows: HCs, conductive carbon black and poly (vinylidene fluoride) were mechanically mixed with mass ratios of 8:1:1. Then, N-methyl-2-pyrrolidone (NMP) was added to the mixed powder to form homogeneous slurry. Finally, the slurry was uniformly coated on copper foil by using doctor blade and dried at 110^{o}C for 12 h under vacuum oven. Using lithium metal as the counter electrode, a Celgard 2400 polypropylene film as the separator and 1 M $LiPF_6$ solution in a mixed solvent of ethylene carbonate/diethyl carbonate (1:1 by volume) as the electrolyte, coin batteries (2032 type) were assembled. Electrochemical performance tests were carried out using a battery test system (CT2001A, Land, China) in the voltage range of 0.01-3.0 V (vs. Li^+/Li). Cyclic voltammetry (CV) was tested using a CHI 660D electrochemical workstation in the voltage range of 0.01-3.0 V with a scan rate of 0.1mV s^{-1}.

Table S1: Elemental composition of semi-coke.

Elemental analysis/wt%				
C	H	N	S	O
71.58	3.66	1.57	0.48	22.7

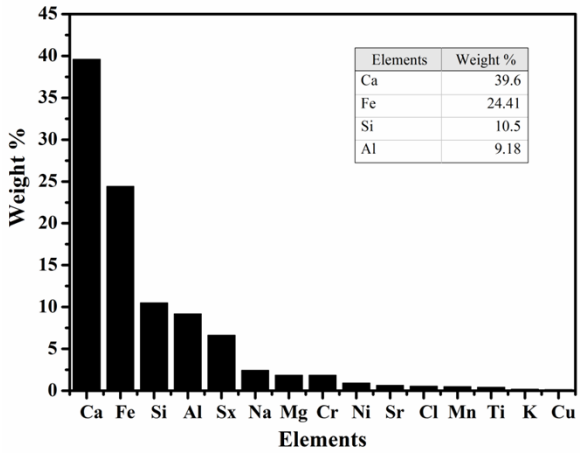

Fig. S1: XRF pattern of ash in raw material semi-coke (SC).

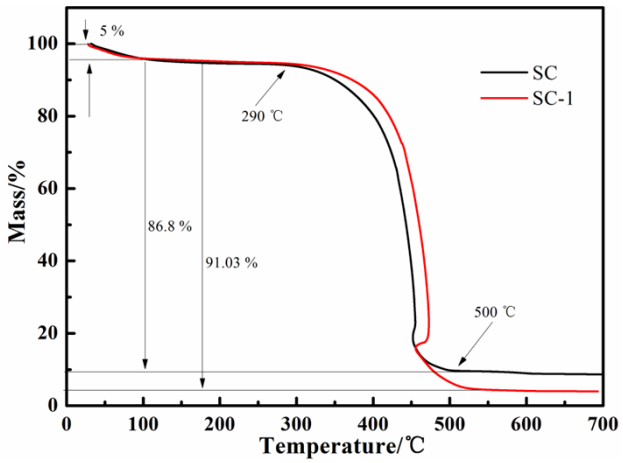

Fig. S2: TG curves of SC and SC-1 in air.

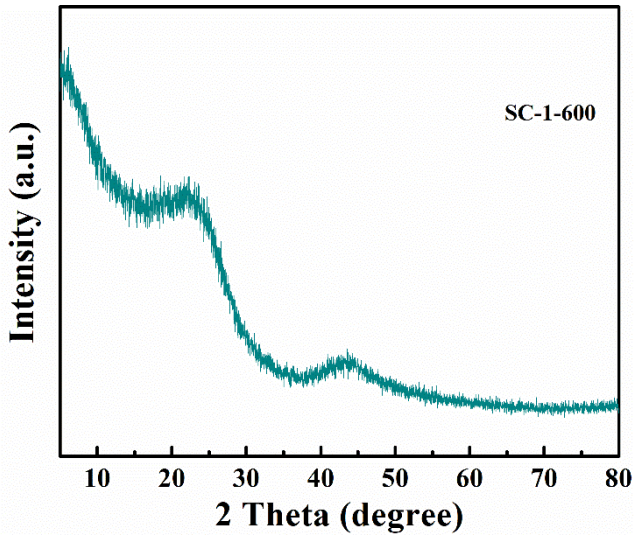

Fig. S3: XRD pattern of SC-1-600.

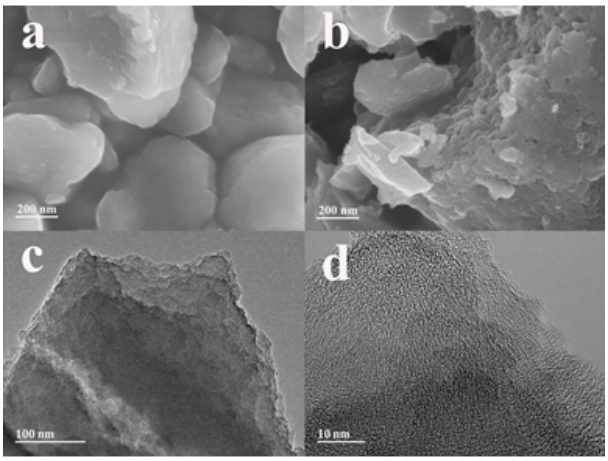

Fig. S4: SEM images (a, b) of SC and SC-1, TEM (c), HRTEM image (d) of SC-1.

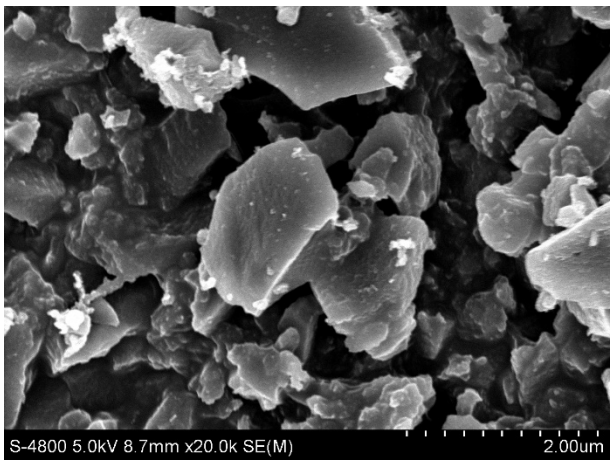

Fig. S5: SEM images of SC-1-600.

Table S2: Summary of physical characterization of the samples.

Samples	SSA[a] $m^2\ g^{-1}$	V_t[b] $cm^3\ g^{-1}$	V_m[c] $cm^3\ g^{-1}$
HC-500	91.09	0.09	0.02
HC-600	343.60	0.46	0.12
HC-700	37.99	0.06	0.01
SC-1	16.55	0.02	<0.01
SC	4.57	<0.01	<0.01

[a] SSA specific surface area

[b] total pore volume from adsorption isotherms at a relative pressure P/P_0 of 0.95

[c] mesopore volume (pore size 2-50 nm) from BET analysis

Table S3: The carbon yield of HCs at different temperature.

Carbonization temperature	500°C	600°C	700°C
HC	57.2%	53%	48.4%