Supporting Information

High-Performance Symmetric Supercapacitor Constructed Using Carbon Cloth Boosted by Engineering Oxygen-Containing Functional Groups

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Calculation

Single Electrode: Areal capacitances of the single electrodes were calculated according to the following equation (GCD):

$$C_A = \frac{I \times \Delta t}{\Delta V \times S} \qquad (1)$$

where C_A (F cm^{-2}) is the areal capacitance, I (A) is the constant discharging current, Δt (s) is the discharging time, ΔV (V) is the potential window, and S (cm^2) is the surface area of electrode.

AECC //AECC-SCs: the cell (device) capacitance (C_{cell}) and volumetric capacitance (C_V) was estimated from galvanostatic charge/discharge information using the following equations:

$$C_{cell} = \frac{I \times \Delta t}{\Delta V} \qquad (2)$$

$$C_V = \frac{C_{cell}}{V} = \frac{I \times \Delta t}{V \times \Delta V} \qquad (3)$$

where, I (A) is the applied current, V (cm^2) is the area of the whole device, Δt (s) is the discharging time, ΔV (V) is the voltage window.

Areal energy density and power density of the devices were obtained from the following equations:

$$\mathrm{E} = \frac{1000}{2 \times 3600} C_A \Delta V^2 \qquad (4)$$

$$\mathrm{ESR} = \frac{iR_{drop}}{2I} \qquad (5)$$

$$\mathrm{P} = \frac{\Delta V^2}{4ESR \times V} \qquad (6)$$

where C_V is the volumetric capacitance obtained from Equation (3) and ΔV (V) is the voltage window. ESR (Ω) is the internal resistance of the device. iR_{drop} is the voltage drop between first and second points from its cut-off of discharge curve. V is the volume of the device.

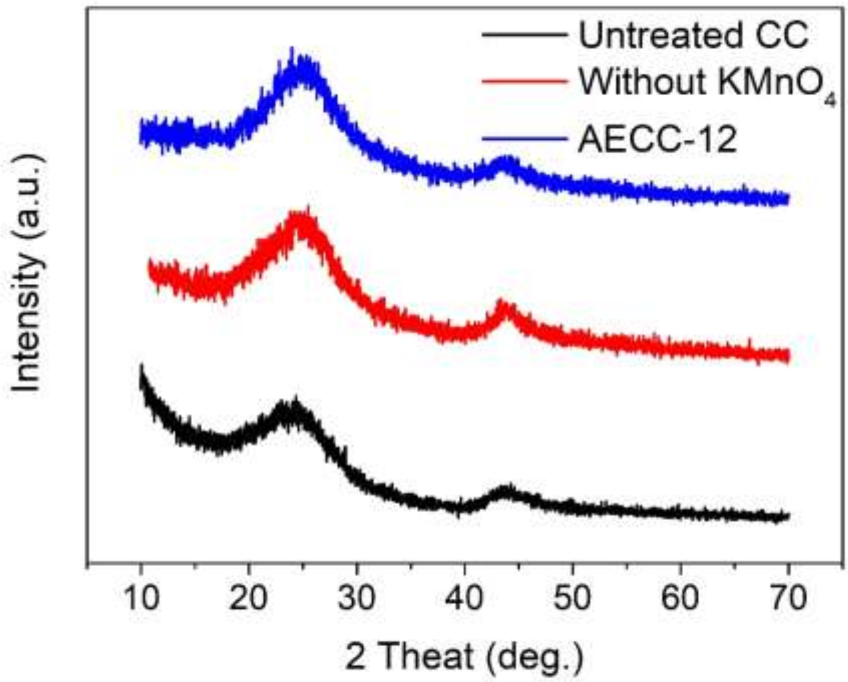

Figure S1 XRD pattern of the untreated CC, acid-etched CC without $KMnO_4$ and AECC-12 samples.

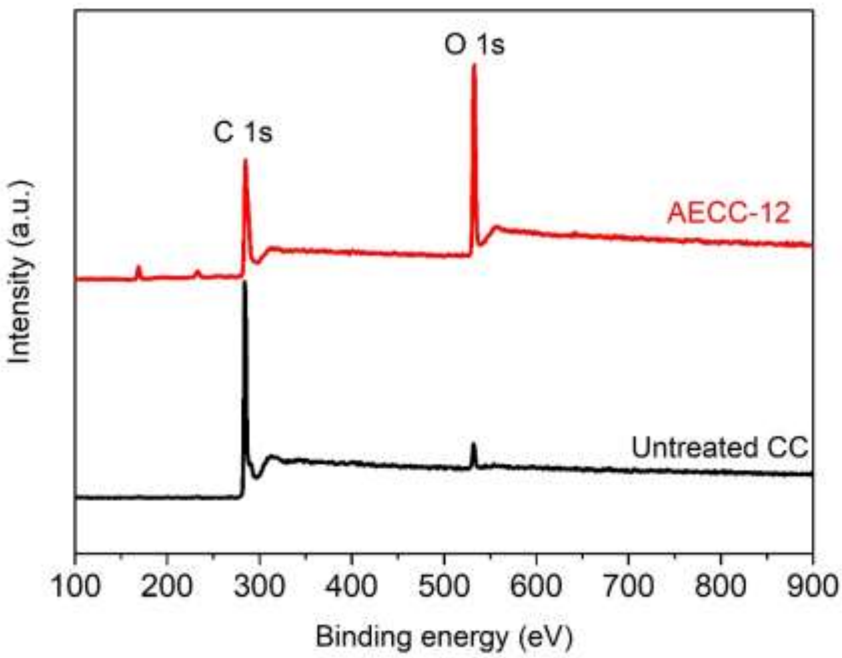

Figure S2 XPS survey spectra of the untreated CC and AECC-12 samples.

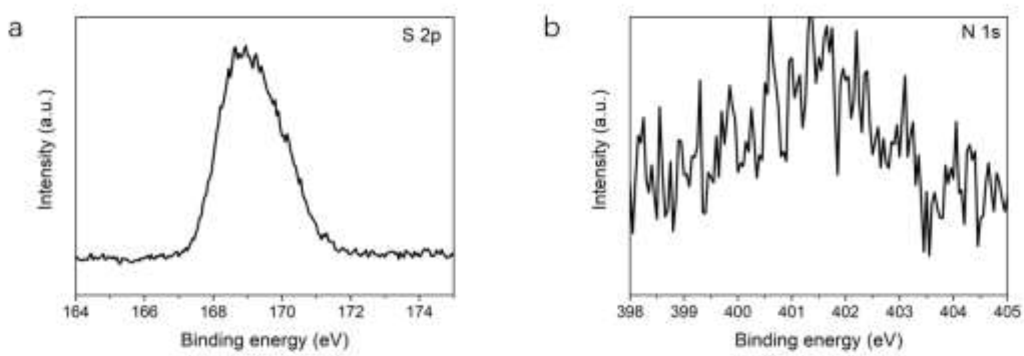

Figure S3 High resolution XPS (a) S2p and (b) N1s spectrum of AECC-12 sample.

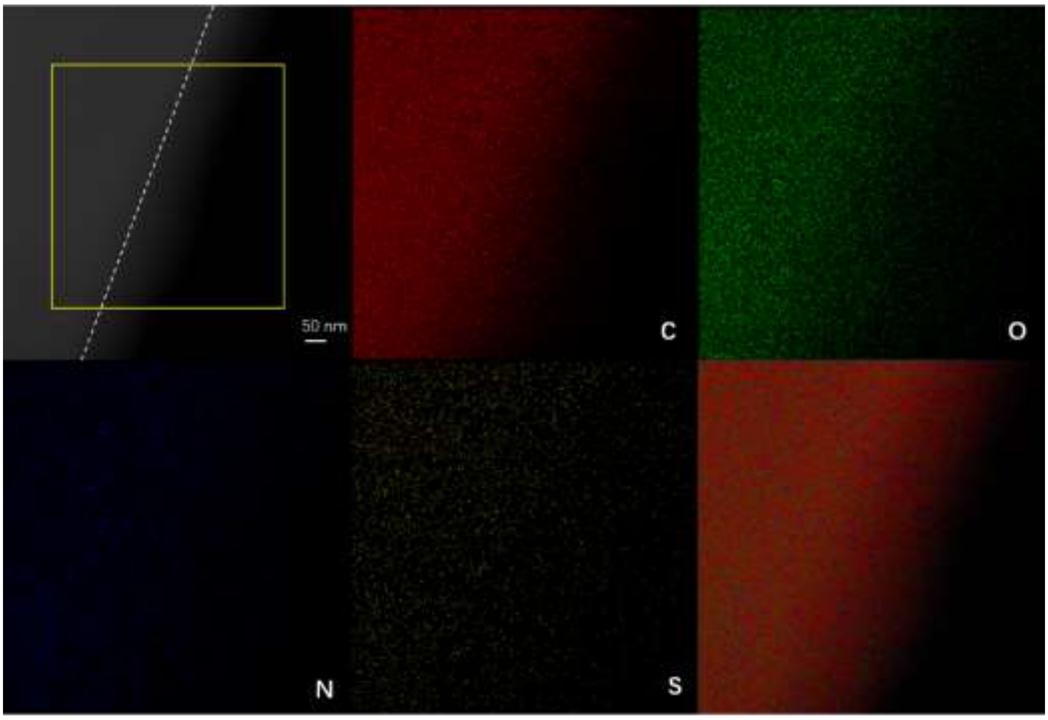

Figure S4 HAADF-STEM image and corresponding elemental mapping images of AECC-12.

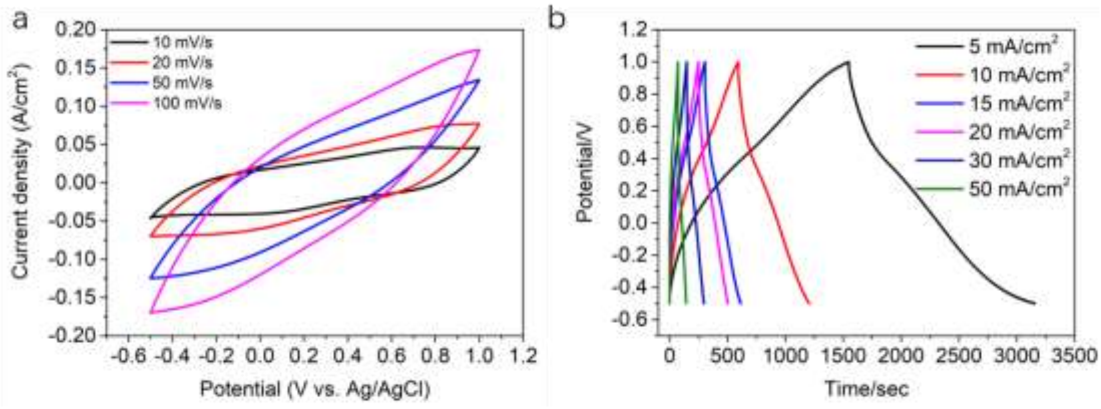

Figure S5 (a) CV curves for the AECC-12 electrode collected at different scan rate (b) Galvanostatic charge/discharge curve collected at different current density.

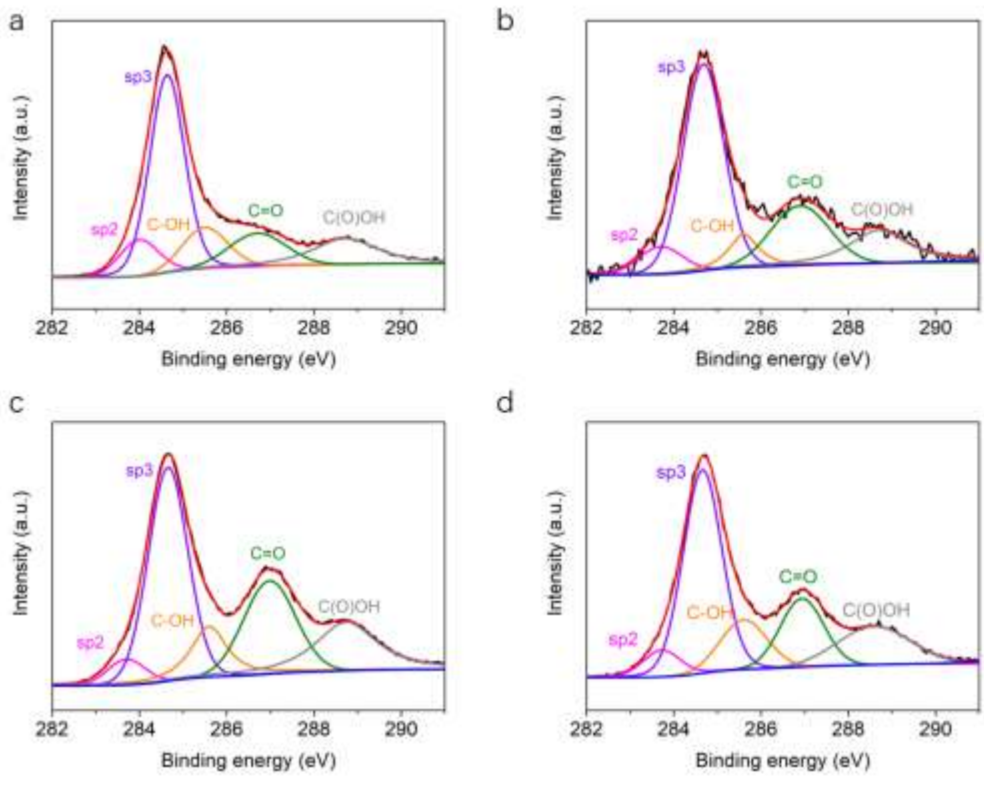

Figure S6 deconvoluted C1s XPS spectrum of the (a)AECC-1, (b)AECC-6, (c) AECC-12 and (d) AECC-24 sample

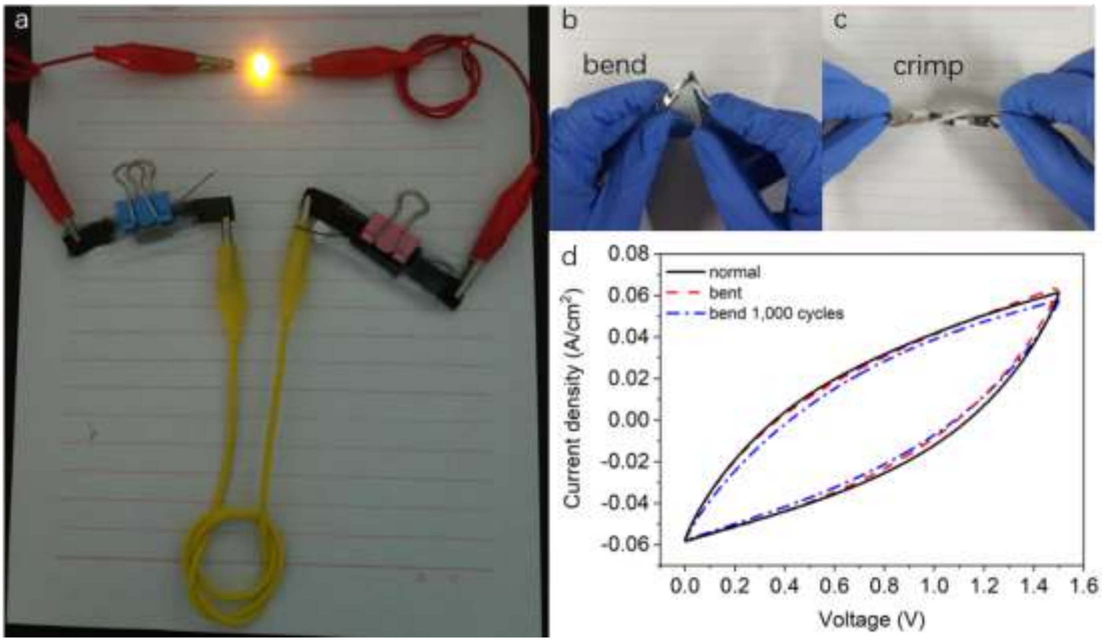

Figure S7 (a) a digital picture of two solid-state symmetric SCs devices in series powered the LED (3 V) indicators. Flexible all-solid-state symmetric SCs at the (b)bent and (c)crimp status. (d) CV curves of the flexible all-solid-state symmetric SC device collected at a scan rate of 100 mV s^{-1} under normal, bent and bend 1,000 cycles conditions.