Electronic Supplementary Information

Improved supercapacitor performances by adding carbonized C_{60}-based nanospheres to PVA/TEMPO-cellulose hydrogel-based electrolyte

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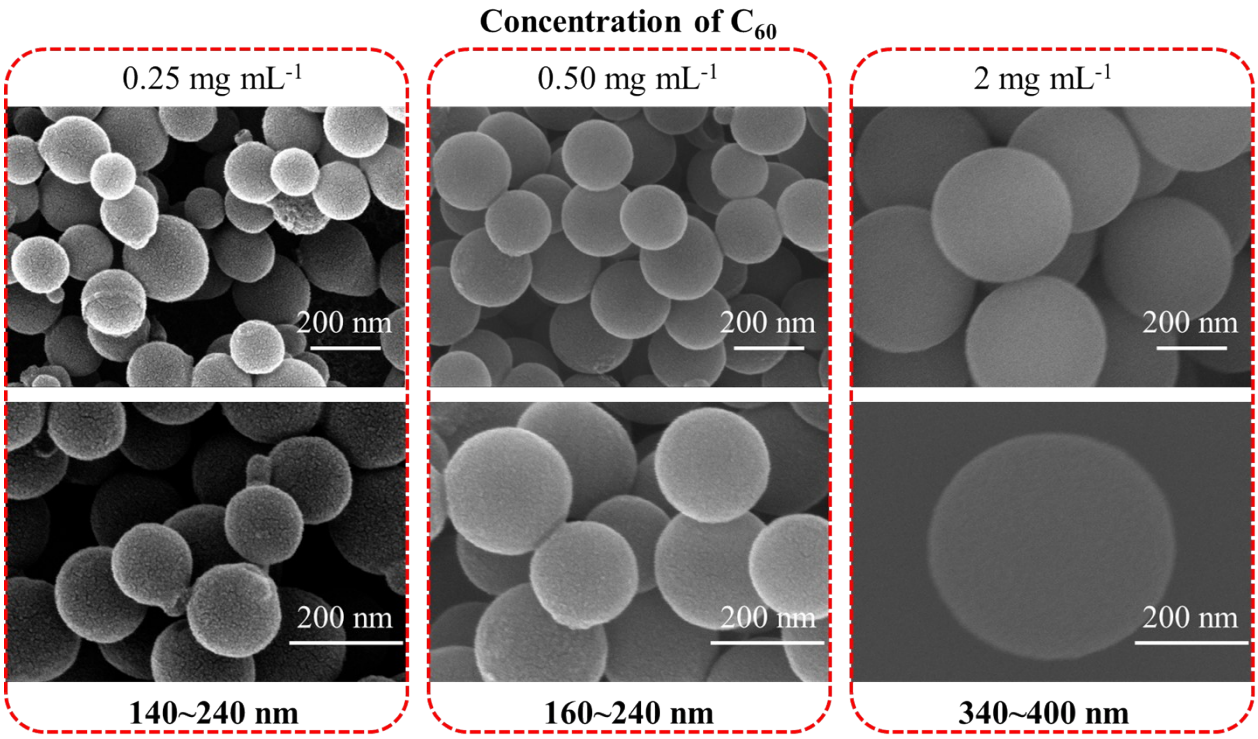

Fig. S1. SEM images of C_{60}-based nanospheres fabricated with different C_{60} concentrations.

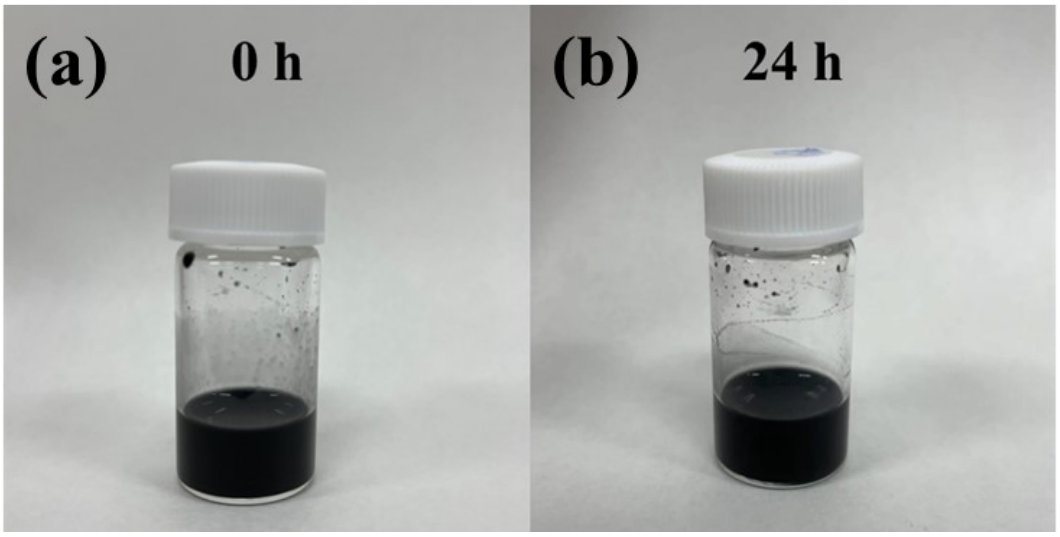

Fig. S2. Photos of TCCS aqueous suspension after (a) 0 h and (b) 24 h of storage.

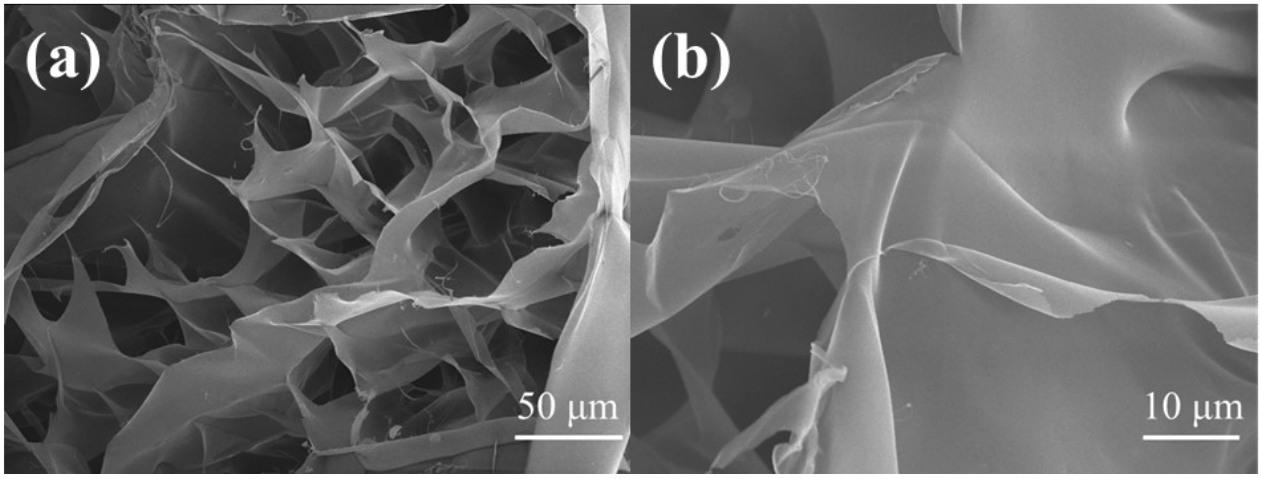

Fig. S3. SEM images of the porous structure of freeze-dried TC films. The image (b) is a magnified one of the image (a).

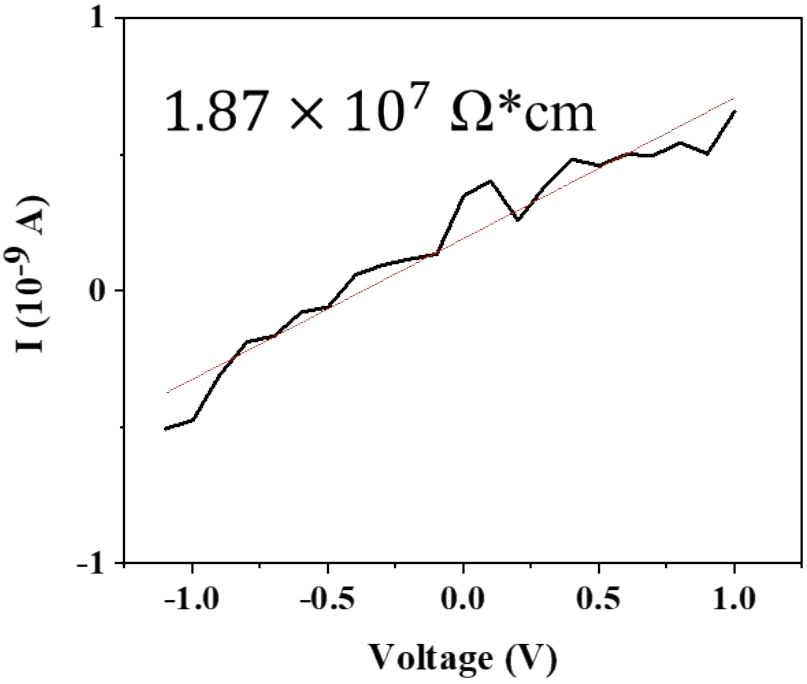

Fig. S4. The I-V curve of a freeze-dried TCCS film at a voltage of -1 V to 1 V. The red line is the fitted curve. The sample size was 0.8 cm × 0.1 cm × 0.03 cm (length × width × thickness).

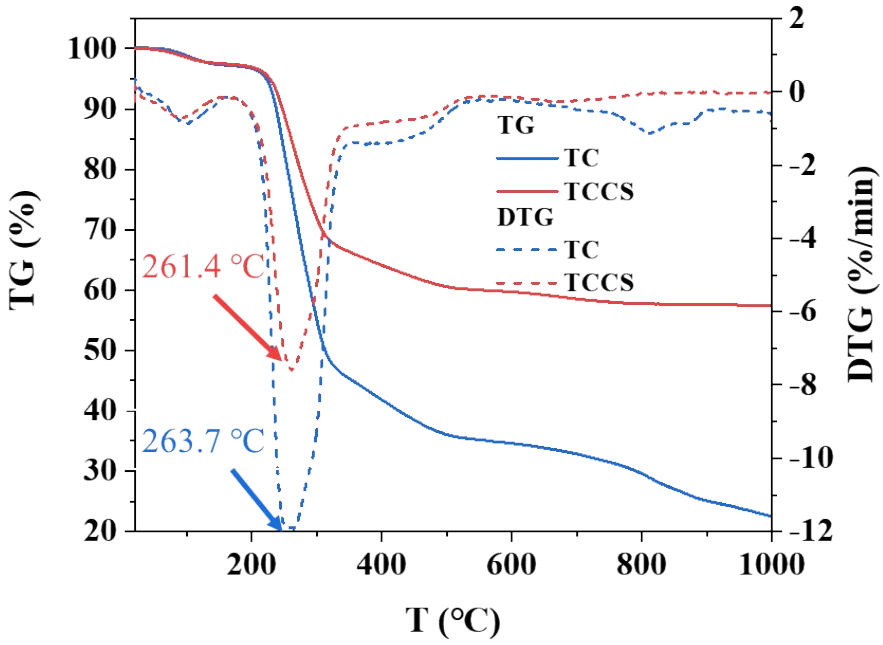

Fig. S5. TGA and DTG curves of freeze-dried TC and TCCS films from 20 to 1000 °C.

Table S1. Decomposition temperature (T_d) and residual amount after TGA measurements of the freeze-dried TC and TCCS films

Sample	T_d (90%) (°C)	Residual amount (%)
TC	237	22
TCCS	247	57

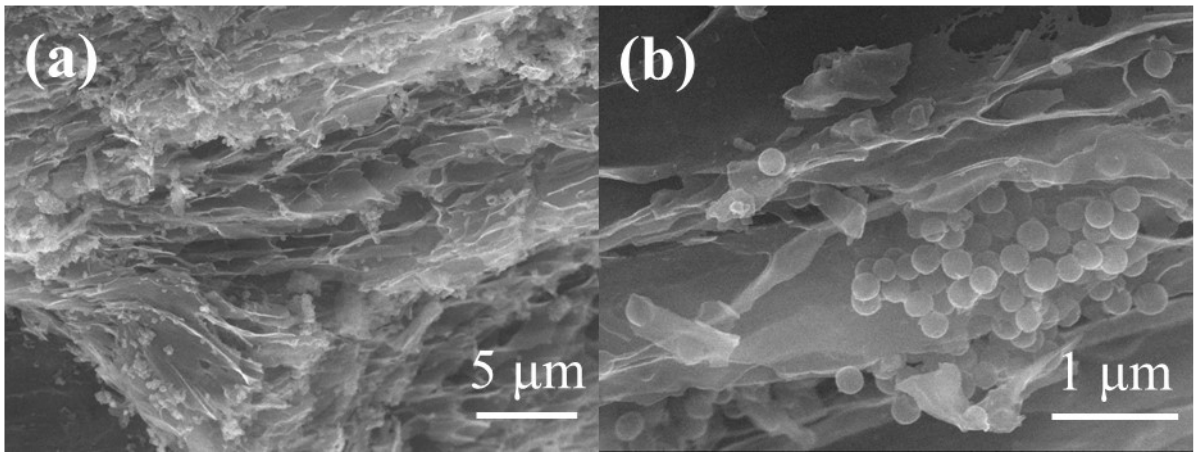

Fig. S6. SEM images of TCCS films after TGA measurements. The image (b) is a magnified one of the image (a).

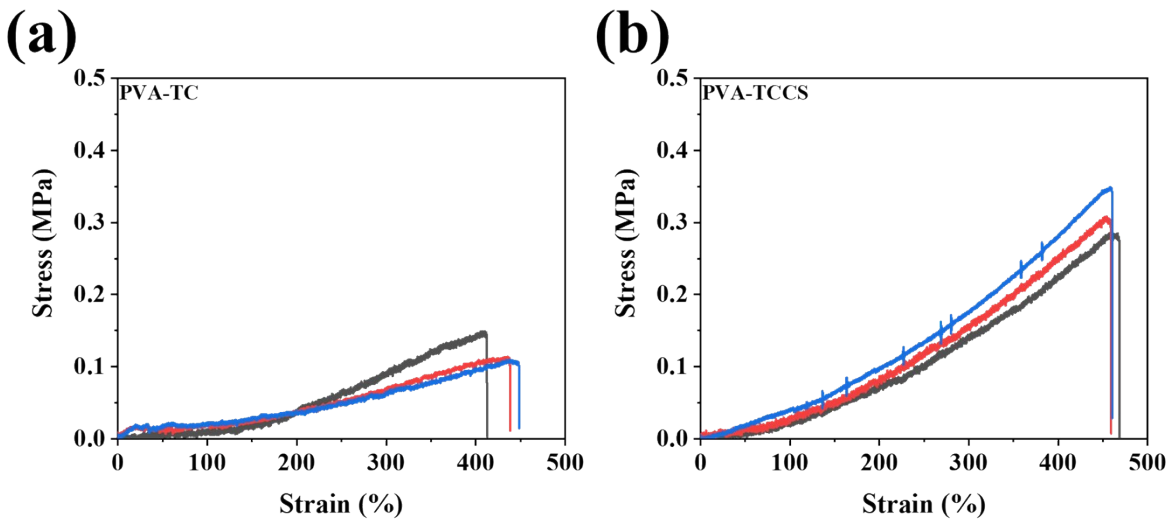

Fig. S7. Strain-stress curves of (a) PVA-TC and (b) PVA-TCCS hydrogels.

The hydrogels were sandwiched and sealed between two stainless steel discs for the measurement. The ionic conductivities (σ) of organogels were calculated according to the following equation:

$$\sigma = \frac{L}{RA} \qquad \text{(S1)}$$

where L represents the thickness of the hydrogel, R represents the impendence value obtained by the intercepts of EIS curves with the x-axis, and A represents the contact area of the organogel between two stainless steel electrodes.

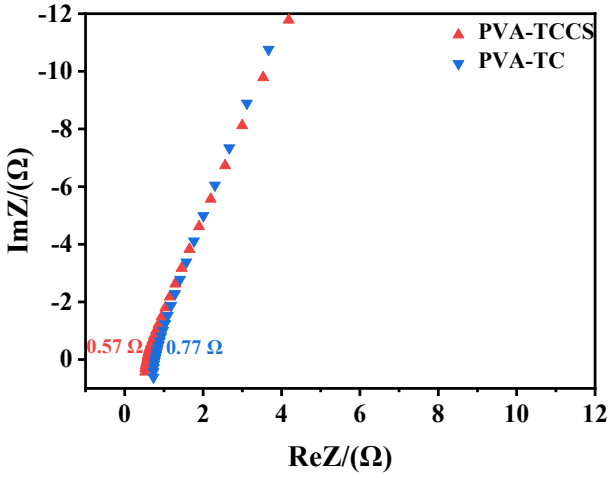

Fig. S8. The EIS plots of PVA-TC hydrogel and PVA-TCCS hydrogel after the solvent exchange with 1 M H_2SO_4 aqueous solution measured at a frequency range from 5×10^5 to 10^{-1} Hz and 10 mV voltage.

Table S2. Area, thickness, and ionic conductivity of the hydrogels measured by EIS.

Sample	Area (cm^2)	Thickness (cm)	Ionic conductivity ($S\ cm^{-1}$)
PVA-TC	1	0.10	0.17
PVA-TCCS	1	0.07	0.09

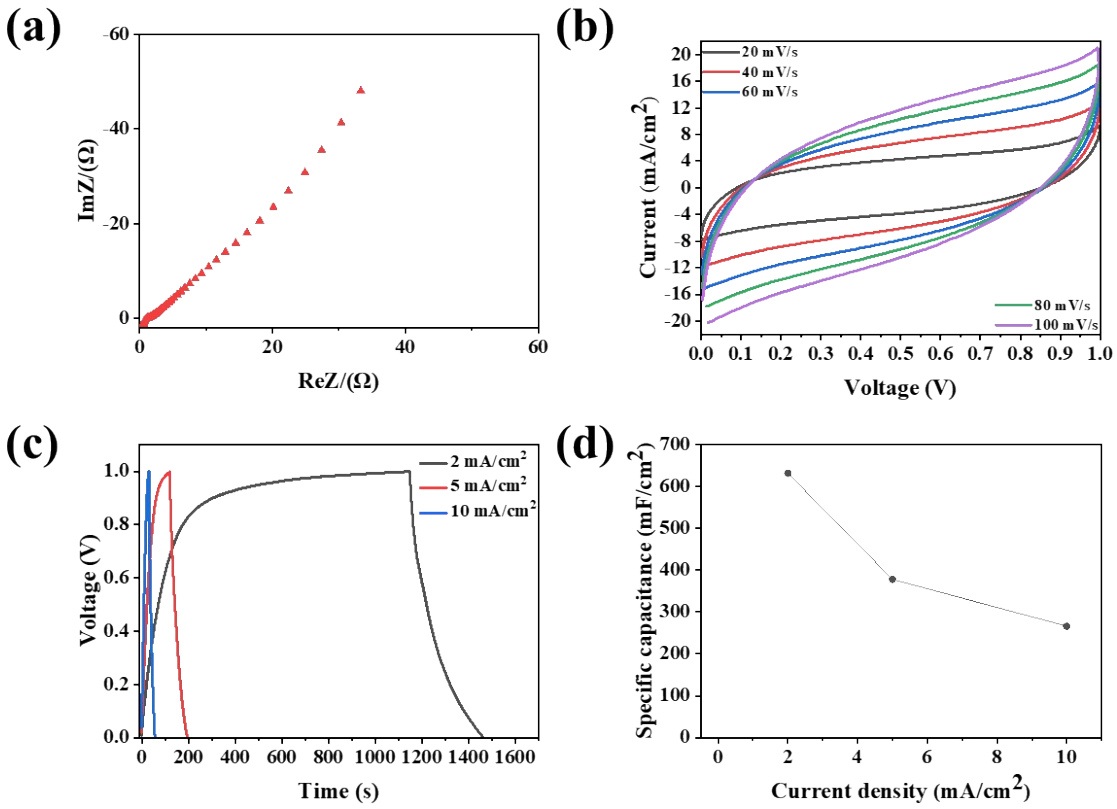

Fig. S9. (a) The Nyquist plots for the electrode. (b) CV curves vs. scan rate for the electrode. (c) GCD profiles vs. current density for the electrode. (d) Specific capacitance as a function of the current density of the electrode.

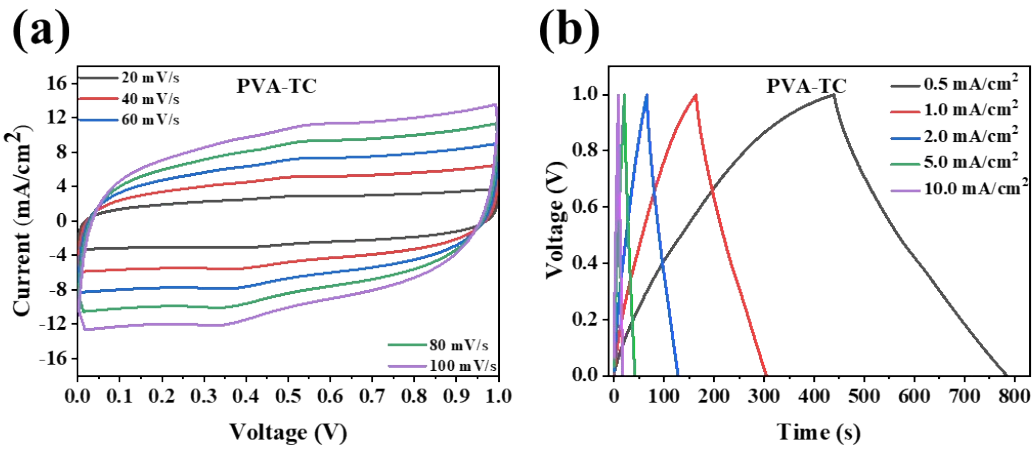

Fig. S10. (a) CV profiles of the PVA-TC system at different scan rates and (b) the corresponding CD profiles at different currents.