Supporting Information

Reduced graphene oxide/polyaniline wrapped carbonized sponge with elasticity for energy storage and pressure sensor

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Characterization

The morphologies and structures of samples were characterized by field emission scanning microscopy (FESEM, 7610, JEOL) and D-MAX II A X-ray diffractometer (XRD). FTIR was carried out using a Nicolet-6700 (Thermofisher). The compressive stress-strain measurements of the symmetrical supercapacitors device was carried out

by tensile and compression tester (SHIMADZU, model AGS-X, 100N, Japan).

Electrochemical measurement

The electrochemical performance was carried out using a CHI 660E electrochemical workstation. In the three-electrode configuration, the platinum foil and Ag/AgCl electrodes were used as counter and reference electrodes. The electrolyte was 1M H_2SO_4. CV measurements and GCD curves were tested at the potential range of 0 V to 1 V. The EIS measurement were recorded under an open circuit potential in the frequency range of 0.01-10000 Hz with a modulating amplitude of 5 mV. The specific capacitance of samples was calculated according to the following two equations:

$$C_m = \frac{I\Delta t}{m\Delta V} \quad \text{(S1)}$$

$$C_m = \frac{1}{Uvm}\int_{U^-}^{U^+} i(U)dU \quad \text{(S2)}$$

In the equation (1), I is the charge-discharge current density, Δt is discharge time, ΔV is the operate voltage window and m is the mass loading of the active material in samples. In the equation (2), U is the voltage window ($U=U^+-U^-$), m is the mass of active materials in electrode, and ν is scan rate (mV s^{-1}) of the CV curve.

The symmetric supercapacitor was fabricated using two pieces of CF-RGO-PANI-600 samples as electrodes, sandwiched with cellulose separator, with 1 M H_2SO_4 as electrolyte. The specific capacitance of device was calculated using the charge integrated from GCD and CV curves individually according to the following formulas:

$$C_m = 2\frac{I\Delta t}{m\Delta V} \quad \text{(S3)}$$

$$C_m = 2\frac{1}{Uvm}\int_{U-}^{U+} i(U)dU \quad \text{(S4)}$$

In the formula (3), I is the charge-discharge current density, Δt is discharge time, ΔV is the operate voltage window and m is the mass loading of the active material in two-electrode. In the formula (4), U is the voltage window ($U=U^{+}-U^{-}$), m is the mass of active materials in two electrodes, and ν is scan rate (mV s^{-1}) of the CV curve. Subsequently, the energy density (E) and power density (P) of two electrodes device were calculated using the following formulas:

$$E = \frac{1}{7.2}CU^2 \quad \text{(S5)}$$

$$P = \frac{E}{\Delta t} \times 3600 \quad \text{(S6)}$$

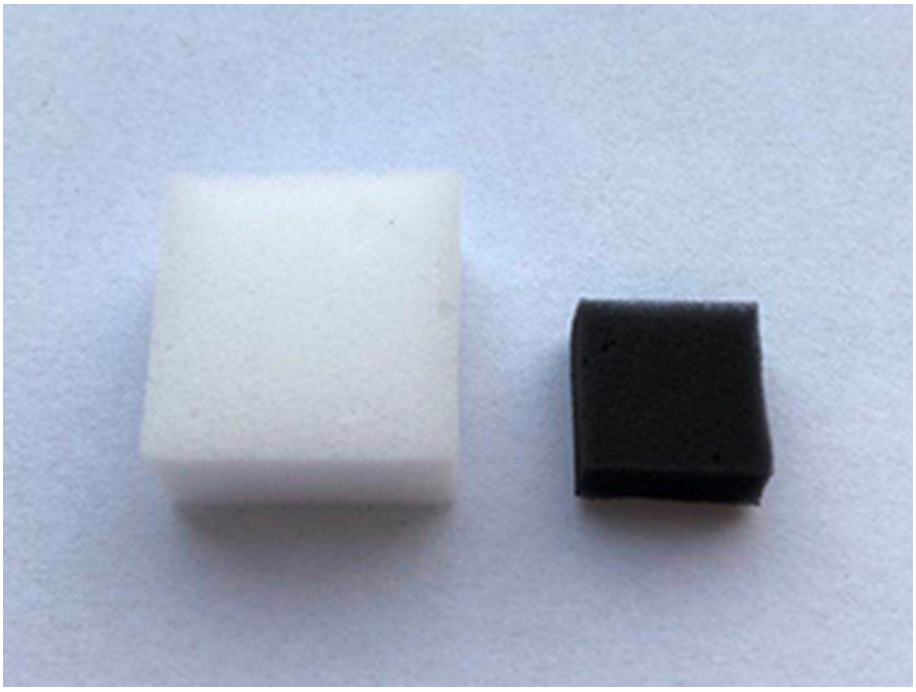

Figure S1. Photo of the melamine and carbon foam(CF).

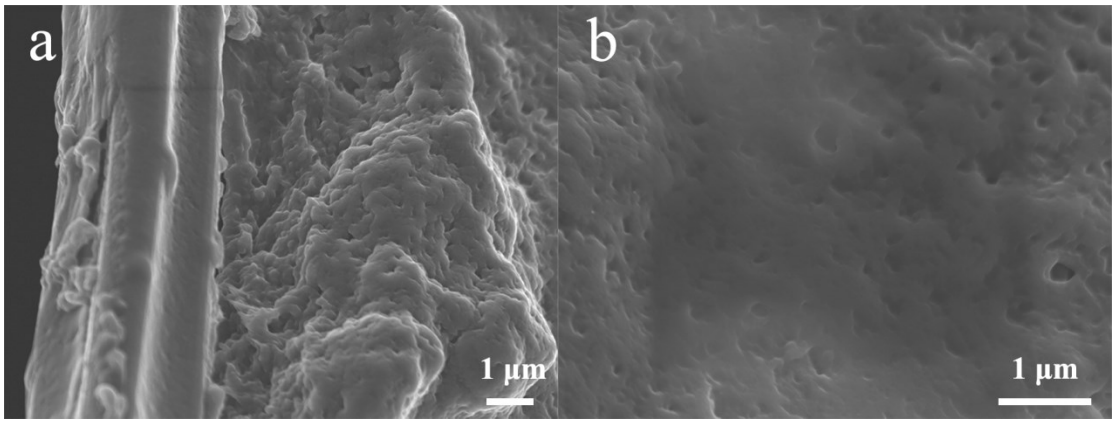

Figure S2. SEM images of the CF-RGO-PANI-900.

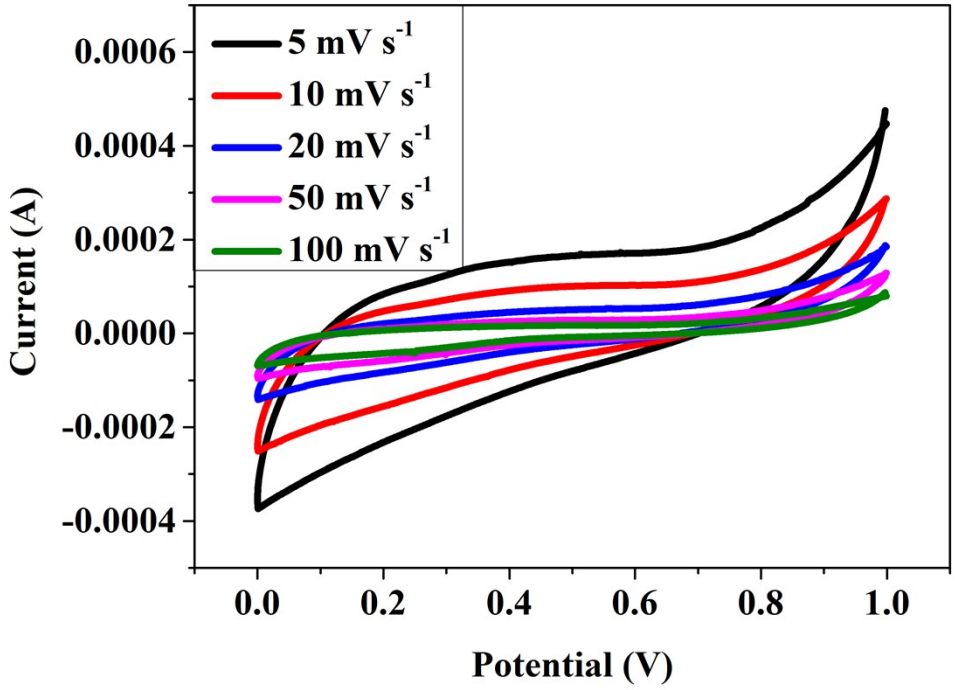

Figure S3. CV curves of CF at different scanning rates.

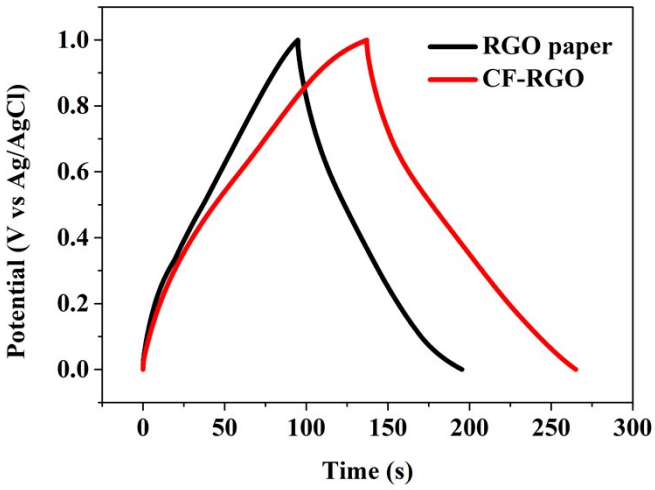

Figure S4. The charge-discharge performance comparison of CF-RGO and RGO paper.

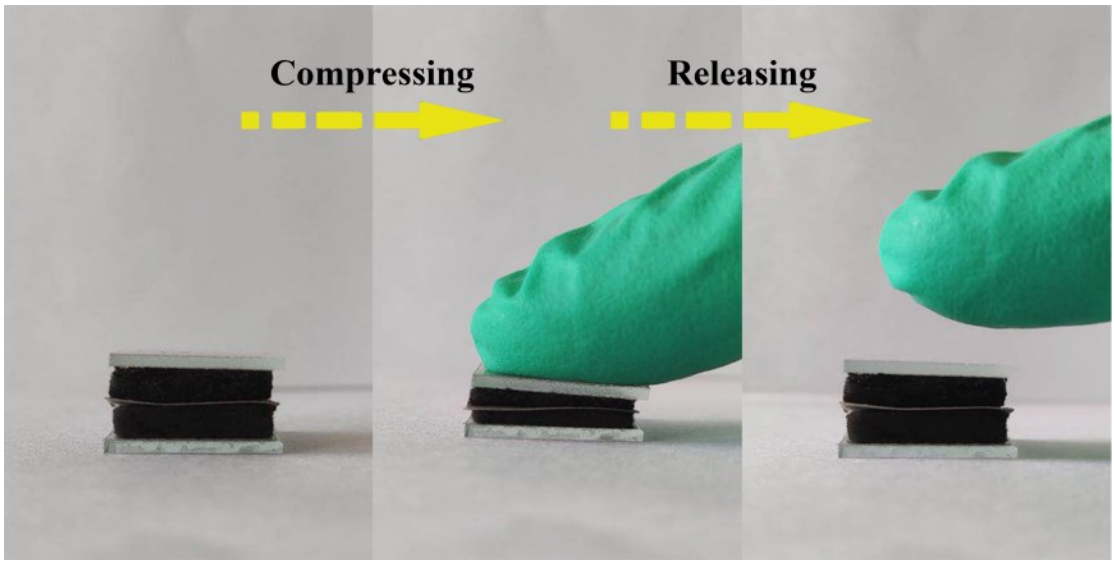

Figure S5. An optical image of an assembled supercapacitor device demonstrating compression and recovery.

Table S1. Energy density and power density of different PANI-based electrodes

Electrode materials	Electrolyte	Energy density	Power density	Refers.
CF-RGO-PANI-600	1M H_2SO_4	10.25 Wh kg^{-1}	10000 W kg^{-1}	This work
RGO-PANI/carbon cloth	1M H_2SO_4	11.38 Wh kg^{-1}	199.8 W kg^{-1}	25
Polyaniline/boron-doped graphene	1M H_2SO_4	5.6 Wh kg^{-1}	2616.7 W kg^{-1}	26
PANI/SWCNTs film	PVA/H_2SO_4 Gel electrolyte	19.45 Wh kg^{-1}	320.5 W kg^{-1}	27
CNFs/PANI	PVA/H_2SO_4 Gel electrolyte	4.4 Wh kg^{-1}	2700 W kg^{-1}	28
Ni-G-CNFs@PANI	PVA/H_2SO_4 gel electrolyte	14.4 Wh kg^{-1}	375.2 W kg^{-1}	29
RGO/PANI	1M H_2SO_4	9.8 Wh kg^{-1}	2000 W kg^{-1}	30