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Supporting Information

Bismuth oxide nanosheets coated electrospun carbon nanofibers film: a free-standing negative electrode for flexible asymmetric supercapacitors

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Calculation methods:

1. Single Electrode

The areal capacitance (C_a) of the electrode could be calculated from their CV curves and galvanostatic charge/discharge curves by the following equations.

$$C_a = \frac{\int IdV}{A \cdot \nu \cdot \Delta V}$$

Here C_a is areal capacitance (mF cm^{-1}), I is the response current (A), V is the potential *vs*. Reference electrode, A is electrode area (cm^2), ν is the scan rate (mV s^{-1}) and ΔV is the potential window (V).

$$C_a = \frac{i \cdot \Delta t}{\Delta V}$$

Here C_a is areal capacitance (mF cm^{-1}), i is the current density (mA cm^{-1}), Δt is the discharging time (s) and ΔV is the potential window (V).

2. ASC Device

The areal capacitance (C_a), specific capacitance (C_s), energy density (E) and power density (P) could be calculated by the following equations.

$$C_a = \frac{i \cdot \Delta t}{\Delta V}$$

$$C_s = \frac{C_a}{m}$$

$$E = \frac{1}{2} C \cdot (\Delta V)^2$$

$$P = \frac{E}{\Delta t}$$

Here C_a is areal capacitance (mF cm^{-1}), i is the current density (mA cm^{-1}), Δt is the discharging time (s), ΔV is the potential window (V), m is the total mass of active materials grown on the two electrodes per unit area.

Table S1. Experimental conditions and chemical component of the prepared samples.

Sample	Time (h)	Temperature (°C)	Precursors			
			Ethylene glycol (mL)	Ethanol (mL)	$Bi(NO_3)_3\bullet 5H_2O$ (g)	ESCNF paper (cm^2)
Bi_2O_3/ESCNF-0.5	6	160	6	12	0.243	2.5×3
Bi_2O_3/ESCNF-1	6	160	6	12	0.485	2.5×3
Bi_2O_3/ESCNF-2	6	160	6	12	0.97	2.5×3

Table S2. Electrical conductivity of the aqueous electrolytes used in electrochemical experiments.

Electrolyte	**Conductivity (mS cm^{-1})**
1 M KOH	191
1 M NaOH	141
1 M LiOH	90
1 M Na_2SO_4	87

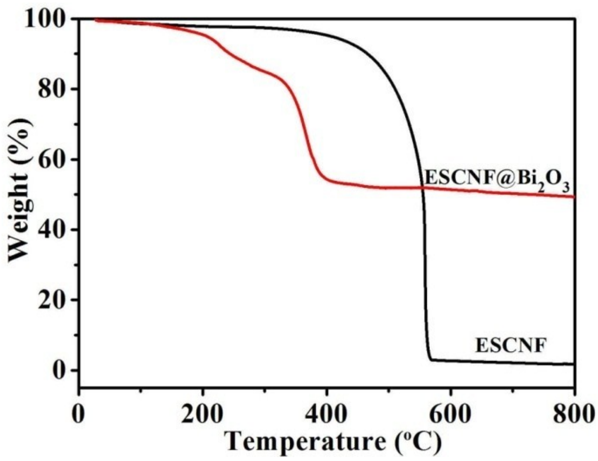

Fig. S1. TGA curves of bare ESCNF substrate and Bi_2O_3 nanosheets grown on ESCNF substrate.

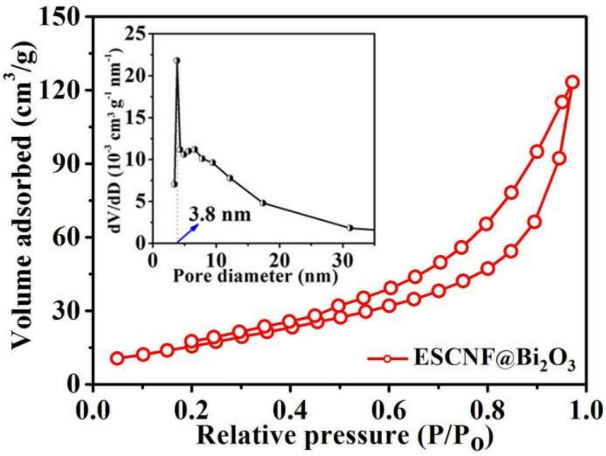

Fig. S2. Nitrogen adsorption and desorption isotherms of ESCNF@Bi_2O_3-1. Inset is the corresponding pore size distribution. The specific surface area is determined to be about 75.3 $m^2\ g^{-1}$ by Brunauer-Emmett-Teller (BET) analysis.

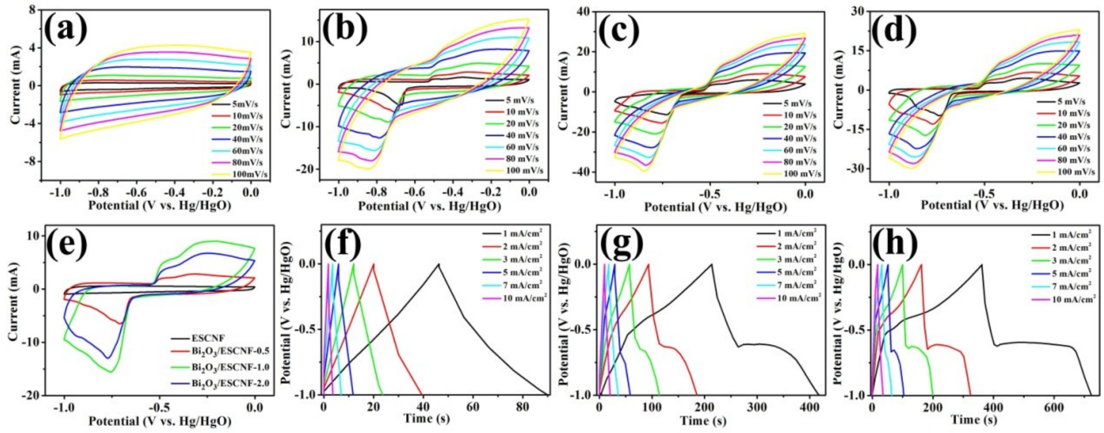

Fig. S3. CV curves at various scan rates in 1 M KOH of (a) ESCNF, (b) ESCNF@Bi_2O_3-0.5, (c) ESCNF@Bi_2O_3-1, (d) ESCNF@Bi_2O_3-2, (e) CV curves of samples at a scan rate of 10 mV s^{-1}. GCD curves at different current densities in 1 M KOH of (f) ESCNF, (g) ESCNF@Bi_2O_3-0.5, (h) ESCNF@Bi_2O_3-2.

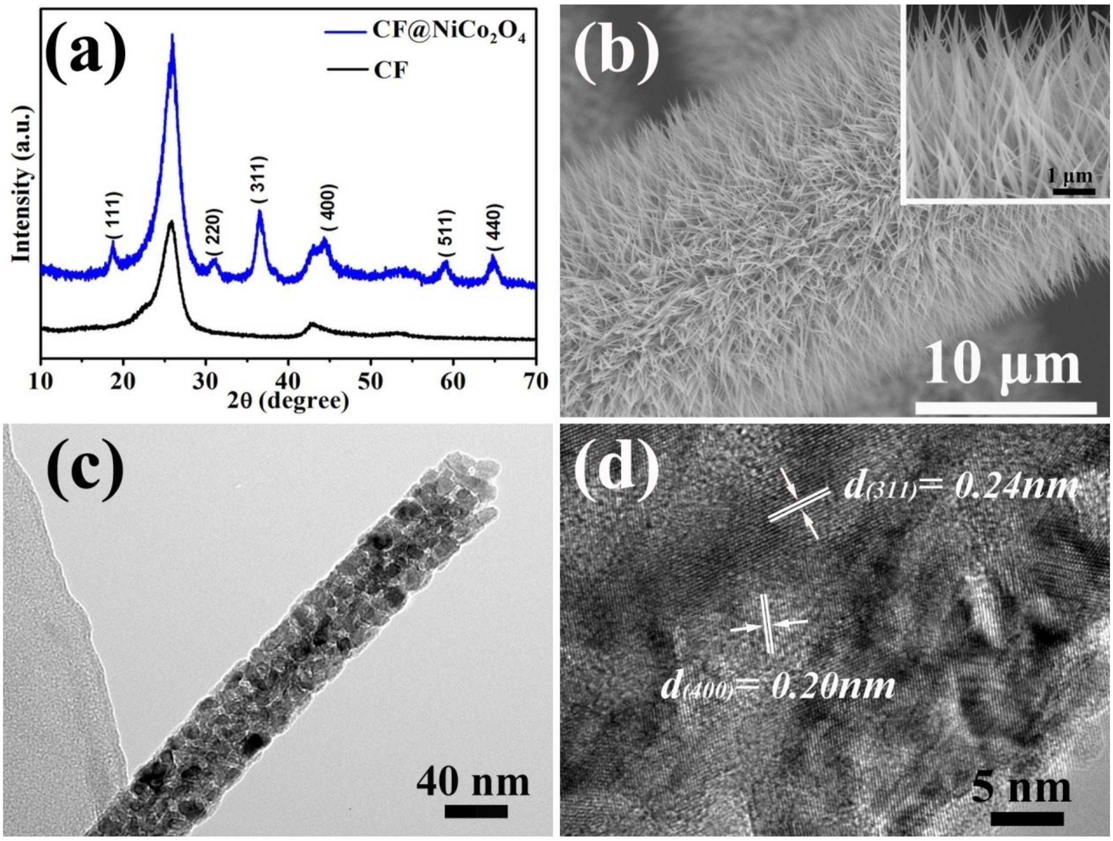

Fig. S4. (a) XRD patterns of the CF@$NiCo_2O_4$ and CF substrate. (b) The SEM images of the CF@$NiCo_2O_4$. (c) TEM and (d) HRTEM image of the CF@$NiCo_2O_4$.

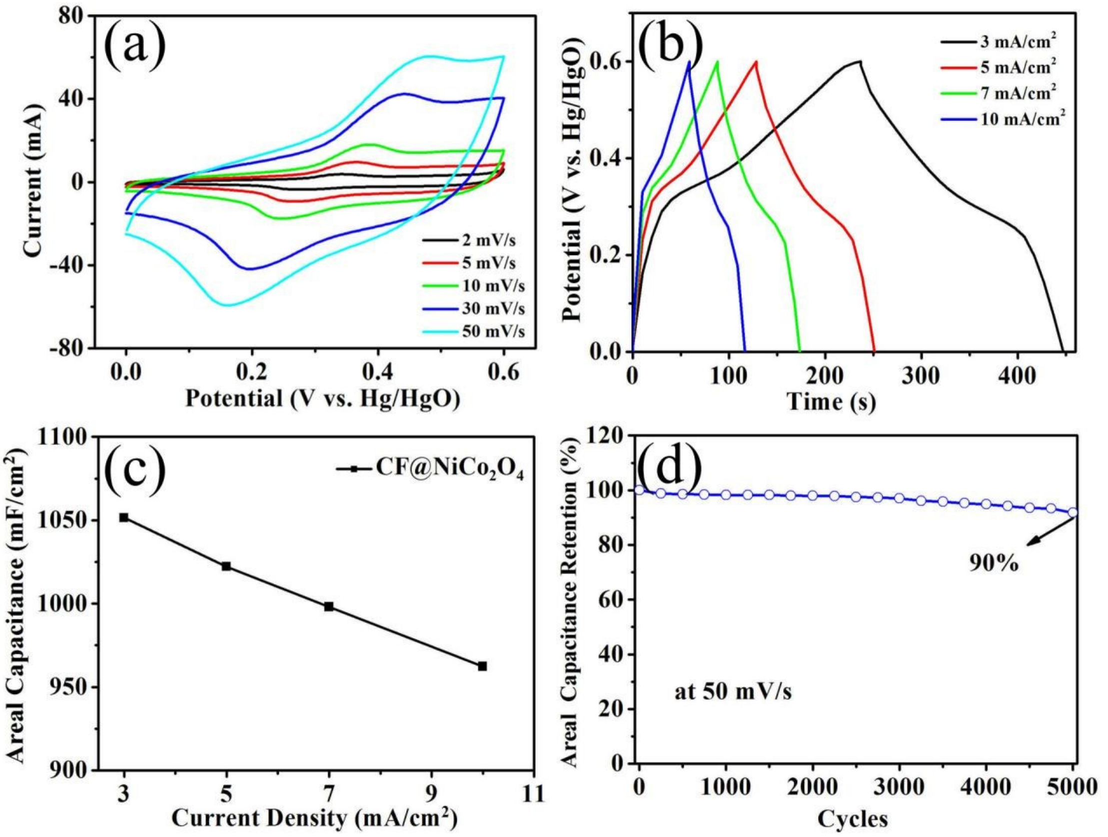

Fig. S5. (a) CV curves of CF@$NiCo_2O_4$ composite electrodes at different scan rates. (b) GCD curves of CF@$NiCo_2O_4$ composite electrodes at different current densities. (c) areal capacitance calculated from GCD curves. (d) cycling stability at a scan rate of 50 mV s^{-1}.

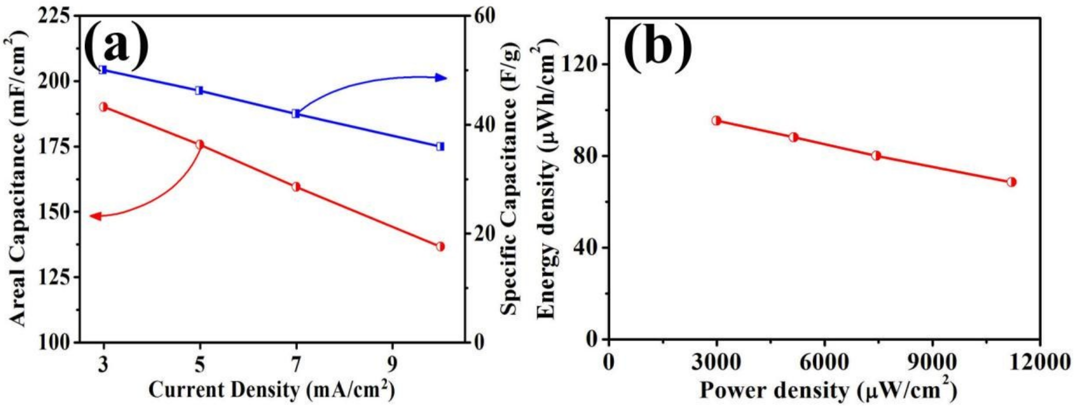

Fig. S6. (a) Areal and specific capacitance as a function of current density. (b) Areal energy and power of the ASC.