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Three-dimensional freestanding hierarchically porous carbon materials as binder-free electrodes for supercapacitors: high capacitive property and long-term cycling stability

Fujun Miao, Changlu Shao*, Xinghua Li*, Kexin Wang, Na Lu, and Yichun Liu.

Center for Advanced Optoelectronic Functional Materials Research, and Key Laboratory of UV-Emitting Materials and Technology (Northeast Normal University), Ministry of Education, 5268 Renmin Street, Changchun 130024, People's Republic of China

*Corresponding author:
Center for Advanced Optoelectronic Functional Materials Research, and Key Laboratory of UV-Emitting Materials and Technology (Northeast Normal University), Ministry of Education, 5268 Renmin Street, Changchun 130024, People's Republic of China
Email: clshao@nenu.edu.cn; Tel. 8643185098803.
Email: lixh781@nenu.edu.cn; Tel. 8643185098803.

Calculation

Areal capacitance (C_a) and ***Volume capacitance (C_v)*** of the freestanding HPC were calculated according to the following formulae:

$$C_a = (I\Delta t)/(S*\Delta V)$$

$$C_v = (I\Delta t)/(V*\Delta V)$$

'I' was the discharge current. 'Δt' was the discharged time. 'ΔV' was the discharge potential except voltage drop. 'S' is geometrical area (1 cm * 1 cm) of a single electrode. 'V' was volume (1 cm * 1 cm * 15 μm) of a single electrode.

Volume energy density (E) and ***power density (P)*** of the symmetric supercapacitor was calculated as follows:

$$E = 0.5*C\Delta V^2$$

$$P = E/\Delta t$$

'C' was the areal or volume capacitance.

Supplementary Figure

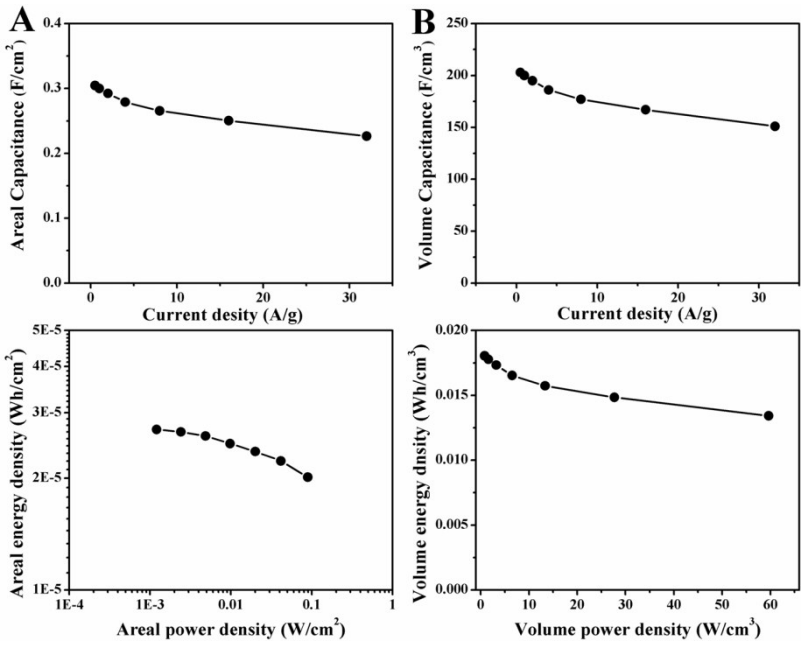

Figure S1. (A) Areal capacitance; (B) Volume capacitance; (C) Areal energy and power density; (D) Volume energy and power density of HPC.

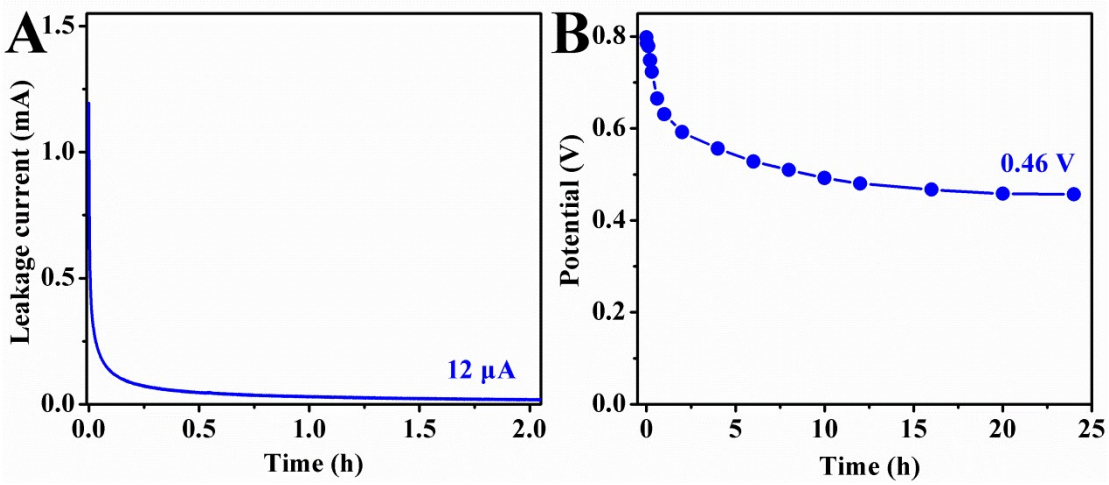

Figure S2. (A) Leakage current curve of the device charged at 5 mA to the potential of 0.8 V and kept for about 2 hours; (B) self-discharge curve of the device after charged at 0.8V for 15 minutes.