Supporting Information for

Hierarchical porous carbon prepared using nano-ZnO as template and activation agent for ultrahigh power supercapacitors

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Experimental

Synthesis and characterization of the HPCs

Commercial nano-ZnO (Huasai Nano-technolegy Co.) with average particle size of ~20 nm were added into a sucrose aqueous solution with the weight ratio of nano-ZnO to sucrose=1:1 under stirring to obtain a homogeneous solution. After dried at 95 °C to remove the water, the ZnO/sucrose composites were heated at 600-950 °C for 2 h under nitrogen atmosphere (99.999%). Then the pyrolysis products were washed with 3 $mol.L^{-1}$ hydrochloric acid to remove the hard template with diluted HCl and deionized water. After dried at 120 °C for 12 h, the hierarchical porous carbon was obtained. The carbon prepared at a pyrolysis temperature of *T* °C was labelled as HPC-*T*.

The morphology of the HPCs was observed using scanning electron microscopy (SEM, Hitachi S4800) and transmission electron microscopy (TEM, Hitachi HT7700). Nitrogen adsorption/desorption isotherms at 77 K were performed on a Micromeritics ASAP2460 for the porosity characteristics. The specific surface area (S_{BET}) and pore size distribution was calculated by the conventional BET (Brunauer-Emmett-Teller) method and density function theory (DFT) method, respectively. The total pore volume (V_t) was calculated from the adsorbed N_2 amount at a relative pressure of 0.99. The micropore volume (V_{mic}) was determined by applying the Dubinin-Radushkevich (DR) analysis in the relative pressure range from 10^{-4} to 10^{-2}. The mesopore volume (V_{meso}) was obtained by subtracting the micropore volume from the total pore volume. The crystalline structures were characterized by X-ray powder diffraction (XRD) patterns in the angle (2θ) range of 10-90 ° with Cu K∝ (λ=0.1541nm) radiation. The Raman spectra were determined with a Renishaw system 1000 with a 50mW He-Ne laser operating at wavelength of 514 nm.

Electrochemical measurements

For electrochemical performance evaluation, electrodes were prepared by coating the mixture of HPCs, acetylene black and PTFE binder with the mass ratio of 80:10:10 on aluminum foil. The average mass loading in each electrode was controlled about 2.1 mg cm^{-2}. After drying under vacuum at 120°C for 12h, the prepared electrodes were assembled into symmetric supercapacitor with polypropylene membrane as separator and 1 $mol.L^{-1}Et_4NBF_4$/acetonitrile (AN) as electrolyte. The cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) were carried out on CHI604C and CS350 electrochemical workstation, respectively. The galvanostatic charge/discharge was carried out on an Arbin cell test system BT-G between 0-2.7V. The specific capacitance (C) of a single electrode was determined with the formula $C=4It/\Delta Vm$, where I is the discharge current (A), t is the discharge time (s), ΔV is the potential change in discharge (V) and m is the total mass of the active material in both electrodes (g). The energy density (E) and power density (P) were calculated based on the following equations: $E=CV^2/8$ and $P=E/t$, where V is the voltage decrease excluding the IR drop occurring at the discharge beginning (i.e. the usable voltage, V), C is the specific capacitance of a single electrode, t is the discharge time (s).

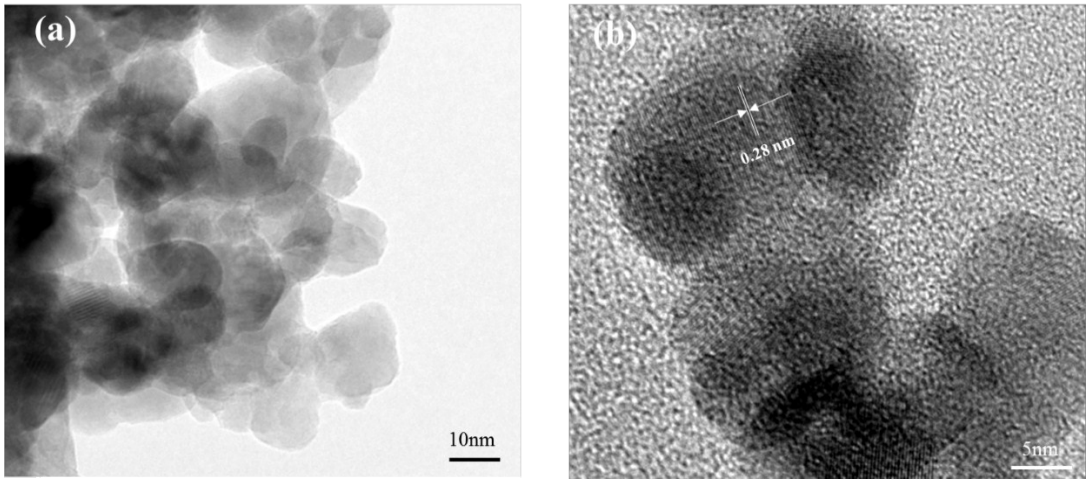

Figure S1. HRTEM images of nano-ZnO particles.

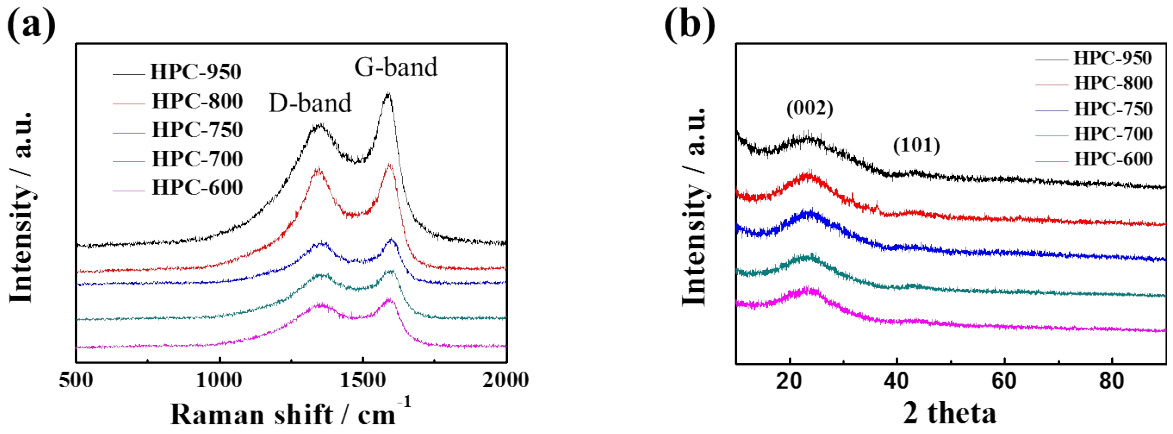

Figure S2. (a) Raman spectra characterization of HPCs. (b) XRD pattern of the as-synthesized HPCs.

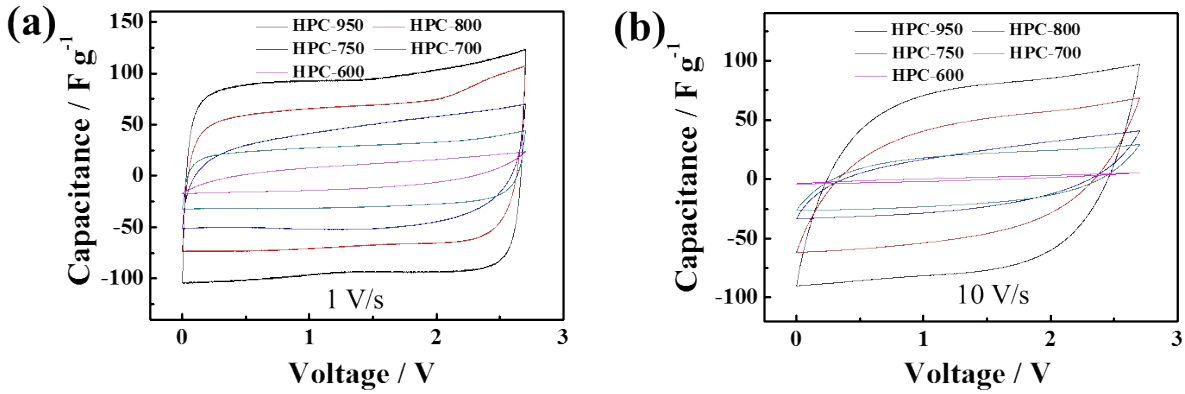

Figure S3. CV curves of the HPC electrodes at the scan rate of 1 V s^{-1} and 10 V s^{-1} in (a) and (b).

Table S1. Pore characteristics and specific capacitance of the HPCs in 1 mol.L^{-1} Et_4NBF_4/AN.

Sample	Yield / %	S_{BET} / m^2 g^{-1}	Pore volume / cm^3 g^{-1}			Capacitance / F g^{-1}
			V_{total}	V_{micro}	V_{meso}	
HPC-600	21.0	542	0.962	0.224	0.738	31
HPC-700	16.8	847	1.331	0.348	0.983	46
HPC-750	10.2	1335	1.685	0.508	1.117	99
HPC-800	9.10	1609	2.162	0.578	1.584	102
HPC-950	3.21	1831	2.557	0.639	1.918	127