Supporting Information for

Hierarchical porous carbon derived from *Allium cepa* for supercapacitors through direct carbonization method with the assist of calcium acetate

Jinhui Xu[a,1,2], Wenli Zhang[a,1,3], DianxunHou[b], WeiminHuang[a,]*, HaiboLin[a,c]

[a]College of Chemistry, Jilin University, Changchun 130012, China

[b]Department of Civil, Environmental, and Architectural Engineering, University of Colorado Boulder, Boulder, CO, USA

[c] Guangdong GuanghuaSci-Tech Co., Ltd., Shantou 515061 China

*Corresponding Author

E-mail: huangwm@jlu.edu.cn (W. Huang)

[1] Authors with equal contribution

[2] Present address: Department of Chemical and Biomolecular Engineering, University of California, Los Angeles, California 90095, USA.

[3]Present address: Materials Science and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, 23955-6900, Kingdom of Saudi Arabia.

Experimental Section

1 Preparation of OPC

Allium cepa (Onion) was treated though solution saturating process and then direct carbonization progress to prepare (Onion derived Porous Carbon, OPC). First, onion was washed by deionized water to wash away dust and soil. Second, cut onion into pieces after peel off onion's husk. Third, 400 g onion was soaked into 2.5 mol/L $Ca(Ac)_2$ solution for 72 h and was dried for 72 h at 90 ^oC before carbonization progress. Subsequently, dehydrated onion/$Ca(Ac)_2$ mixture was carbonized at 850 ^oC for 2 h under N_2 atmosphere. Finally, the obtained carbon was washed by 10% HCl and deionized water respectively and dried at 120 ^oC for 24 h. For comparison, OC-1 (Onion derived Carbon) was prepared by dehydrated onion under the same heat program. OC-2 was prepared with the solid mixture of dehydrated onion and $Ca(Ac)_2$ under the same heat program.

2 Physical characterization

N_2 adsorption/desorption analysis was tested by usinga 3H-2000PM2 analyzer (Beishide, Beijing, China). Surface area was analyzed by BET model and micropore surface area was calculated by t-plot method. Pore width distribution was carried out through H-K model. SU8000 Scanned electron microscope(Hitachi, Japan) was used to characterize the surface morphology of obtained carbon.

3 Electrochemicalmeasurement

The electrode was composed of OPC or OC, electrode acetylene black and PTEE with mass ratio of 8:1:1. The electrode was cut into 1cm×1cm and loaded on foamed nickel at 15 Mpa for 1 min. Areal carbon loading is approximately 3.5 mg/cm^2. Symmetric supercapacitor was assembled with 6 mol/L KOH electrolyte. PMC-1000 electrochemical workstation (AMETEK, USA) was used to analyze Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy (EIS). BTS-4008 battery tester (Neware, China) was used to perform Galvanostatic Charge-Discharge (GCD). All the specific capacitance values are calculated based on our previous paper.

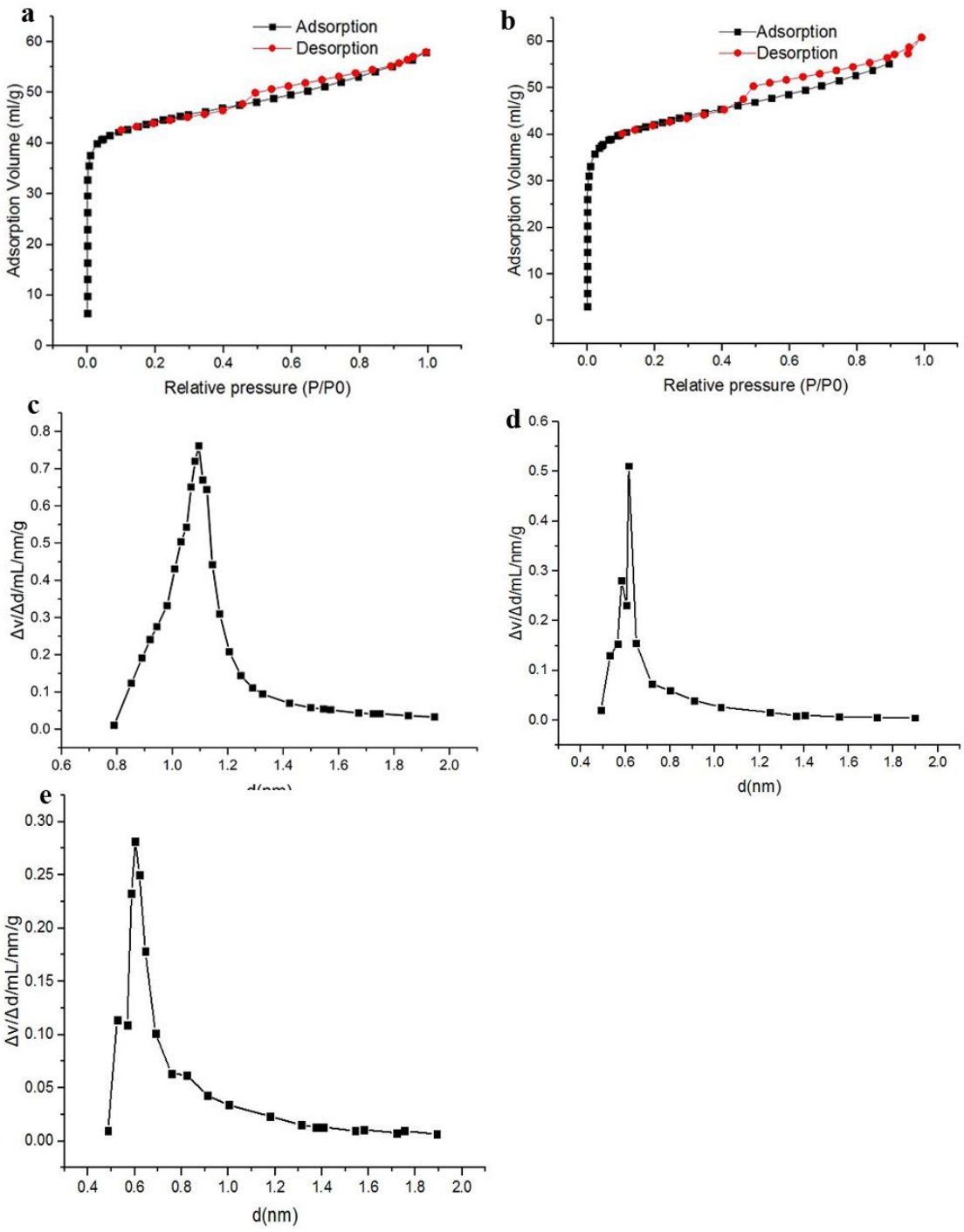

Fig. S1 (a) adsorption-desorption isotherms of OC-1; (b) adsorption-desorption isotherms of OC-2; and mircopore distribution of (c) OPC, (d) OC-1 and (e) OC-2.

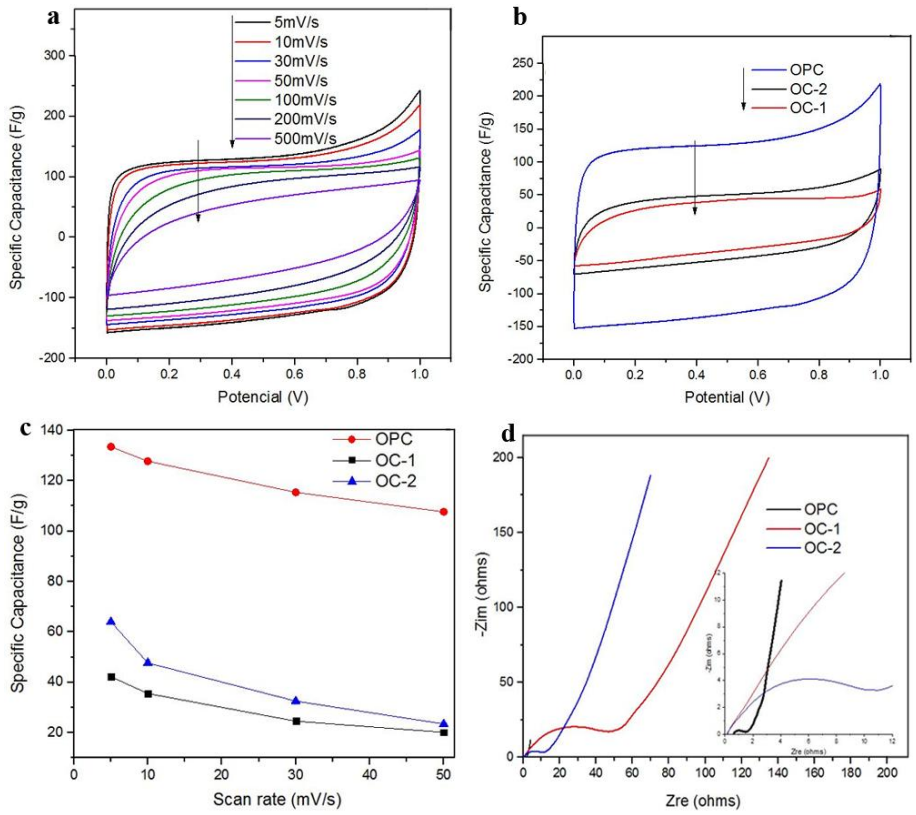

Fig.S2 (a) CVs of OPC in 6 mol/L KOH solution; (b) CVs of OPC, CO-1 and OC-2 at 10 mV/s[1]; (c) Specific capacitance of OPC, OC-1 and OC-2; (d) Nyquist plot of OPC, OC-1 and OC-2.

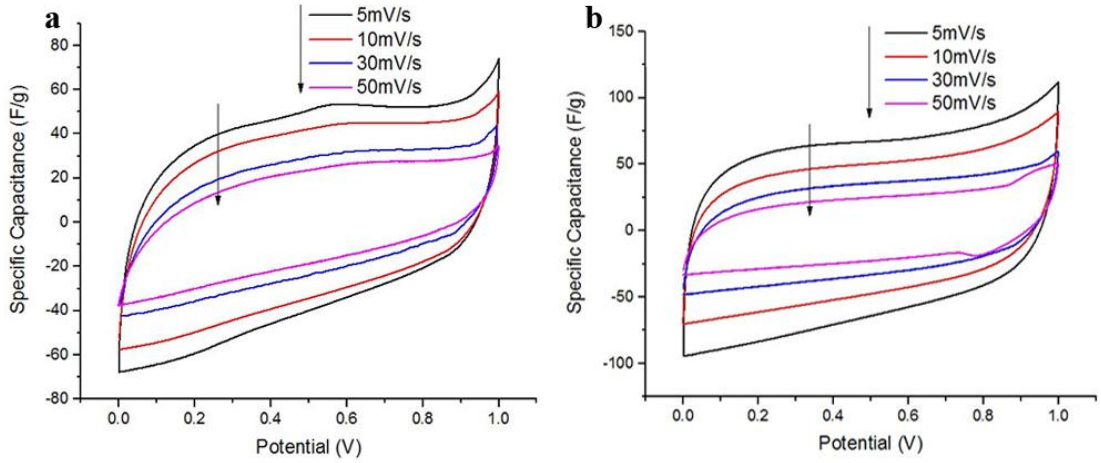

Fig. S3 (a) CVs of OC-1 in 6 mol/L KOH solution; (b) CVs of OC-2 in 6 mol/L KOH solution.

Table S1. Equivalent circuit elements of OPC before and after 2000 GCD cycles.

	R_s Ωcm^2	CPE, Y_o $\Omega^{-1}cm^{-2}s^n$	N	R_{ct} Ωcm^2	Z_w Ωcm^2	C Fcm^{-2}
Initial	0.5967	0.001053	0.7318	0.8134	0.3786	0.224
After 2000 cycles	0.5091	0.0004889	0.8034	0.9402	0.4384	0.197

Table S2. Comparison of the capacitance performance of OPC with other carbons.

Samples	Specific capacitance (F/g) at scan rate of 5 mV/s	Capacitance retention (%) at scan rate of 100 mV/s	Ref.
Porous carbon	104	40	[1]
Active carbon	104	57	[2]
Porous carbon spheres	105	61	[3]
CMK-3	108	78	[4]
OPC	149	80	This work

Reference:

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