Electronic Supplementary Material (ESI) for RSC Advances.

Electrospun Activated Carbon Nanofibers for Supercapacitor Electrode

Mingjia Zhi[a,*], Suhua Liu[a], Zhanglian Hong[a,*], Nianqiang Wu[b]

[a]Department of Materials Science & Engineering, Zhejiang University, Hangzhou 310027, P. R. China

[b]Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV 26506-6106, USA

*Corresponding Author: Mingjia_Zhi@zju.edu.cn, Hong_zhanglian@zju.edu.cn

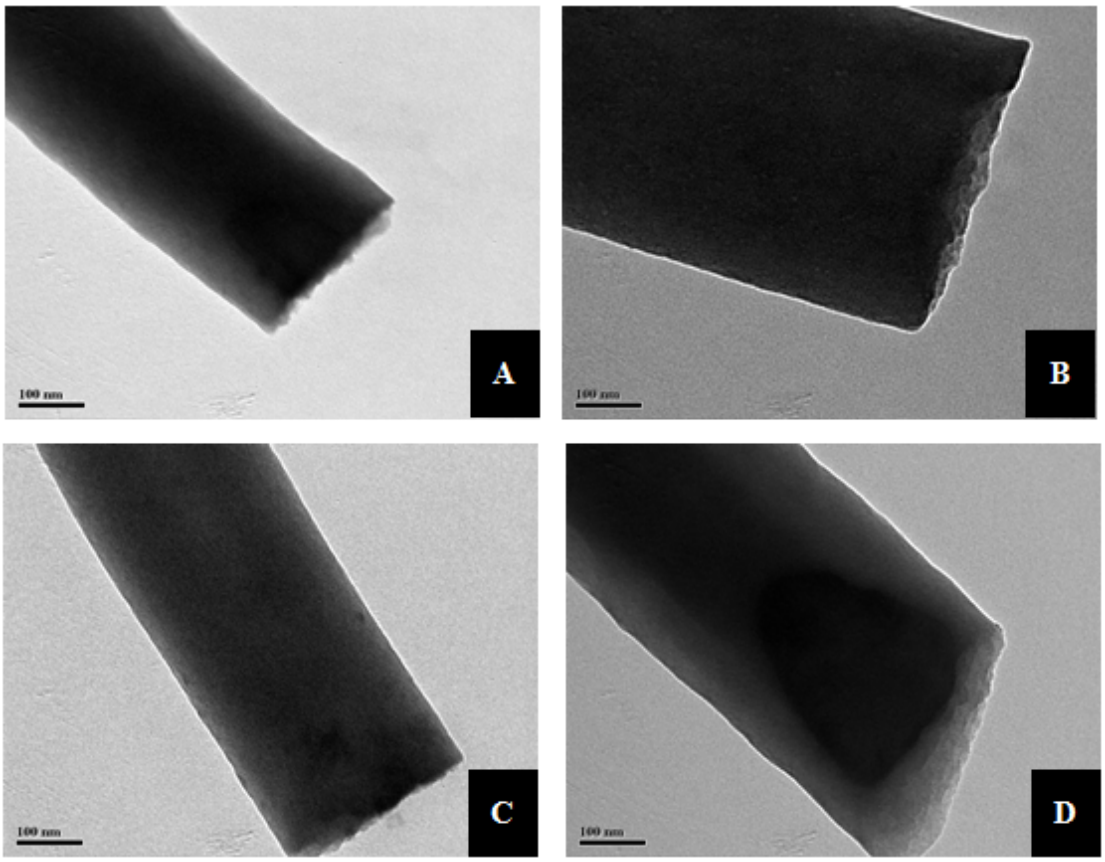

Figure S1: TEM images of the CNF and P-CNF samples, (a) CNF, (b) P-CNF-2, (c) P-CNF-5 and (d) P-CNF-10, the scale bar is 100 nm

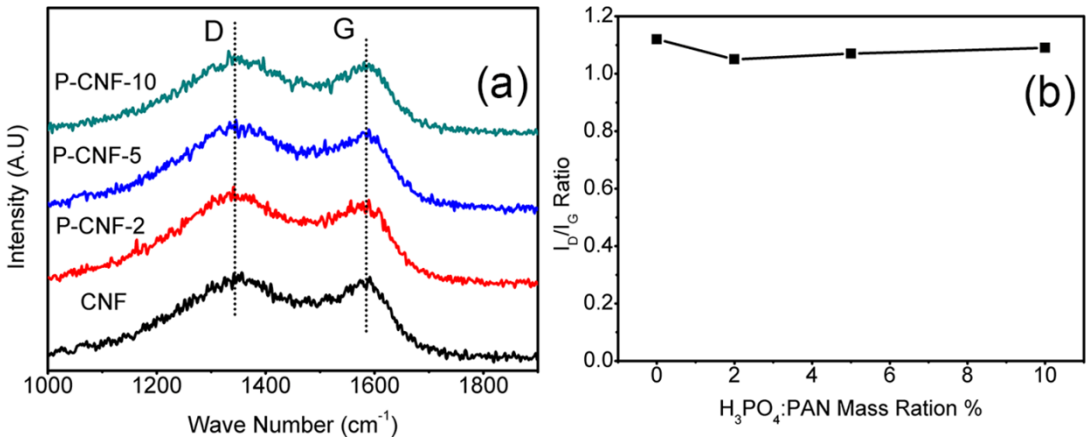

Figure S2: (a) Raman spectra of the CNFs samples, (b) the ratio of I_D/I_G versus the H_3PO_4 concentration

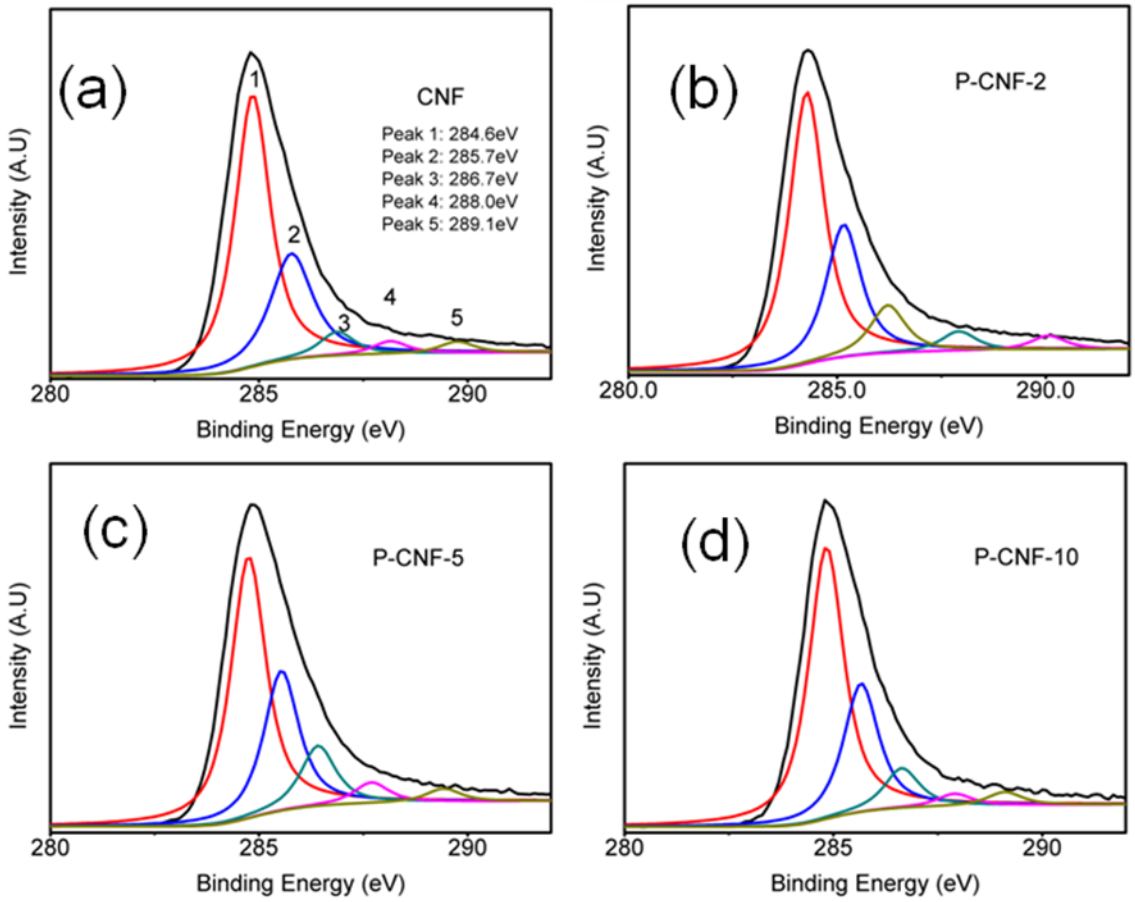

Figure S3: The detail scan of C1s of CNFs; (a) CNF, (b) P-CNF-2, (c) P-CNF-5 and (d) P-CNF-10

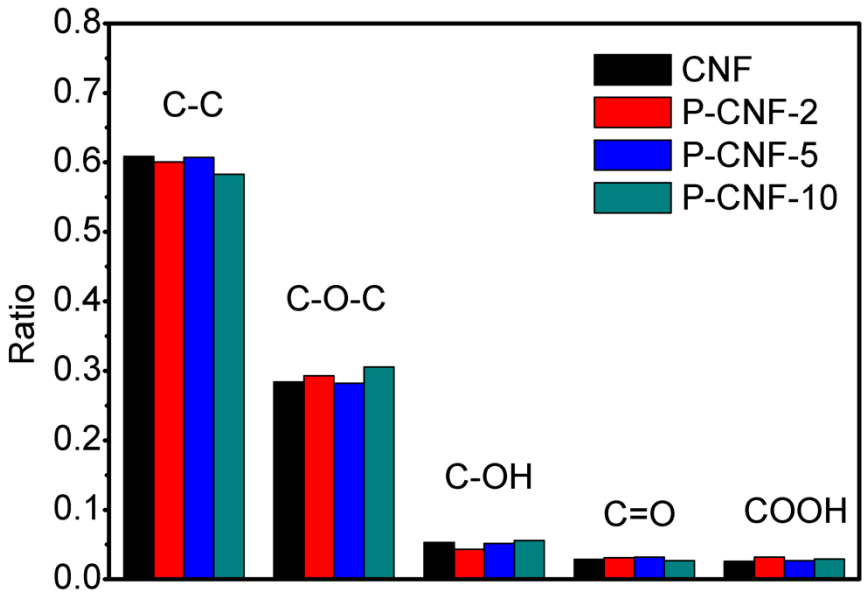

Figure S4: The relative Intensity of the fitted C1s peaks for the CNFs with different H_3PO_4 concentrations

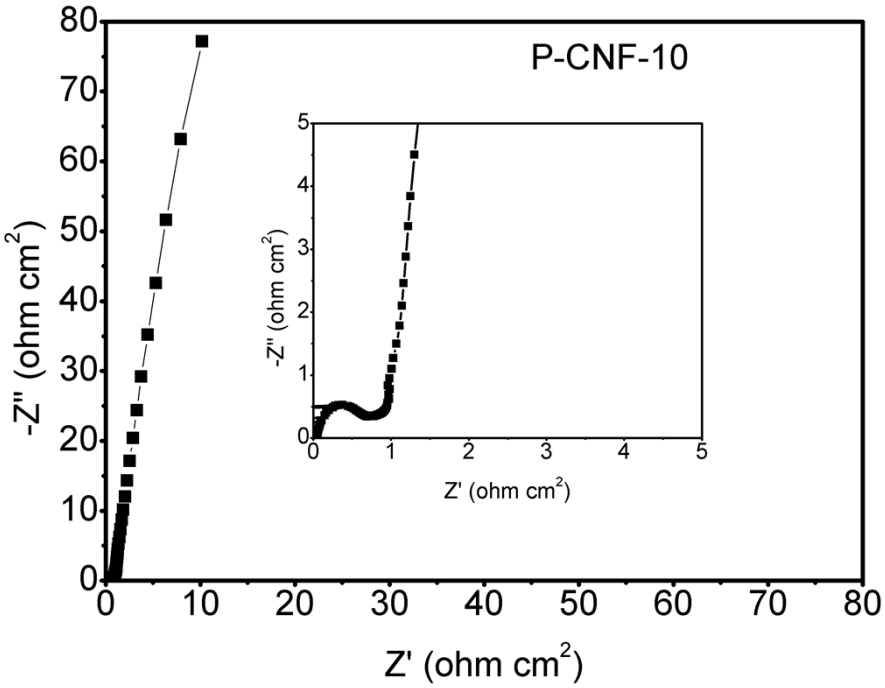

Figure S5: Nquist plot of the P-CNF-10 electrode; the insert image showing the detail at high frequency range

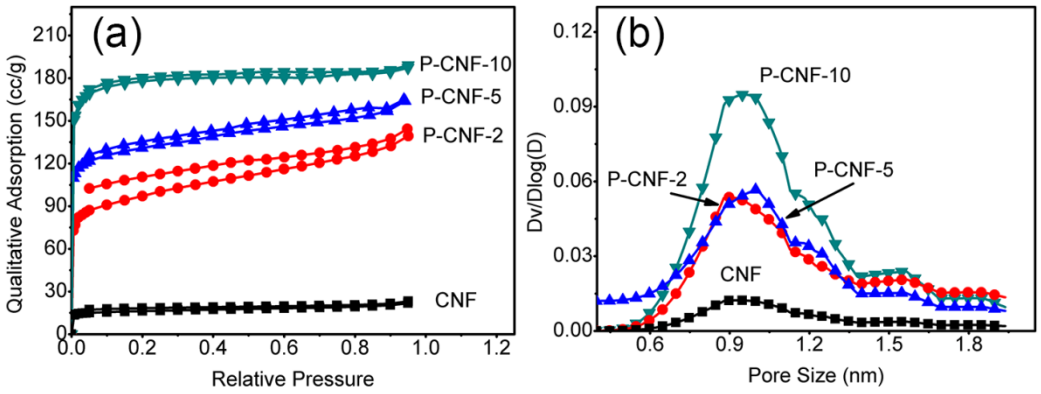

Figure S6: (a) Isotherm adsorption-desorption curves of the CNF samples, (b) the micropore distribution of the CNF samples

Table S1: Comparison of different activation agent used for fabricating porous CNFs

Activation Agent (Price)	Activation Method	Mass Ratio of Activation Agent to PAN	SA (m^2/g)	TPV (cm^3/g)	V micro (cm^3/g)	Specific Capacitance (F/g)	Ref.
$ZnCl_2$ (\$5.1/g)	Co-spun with PAN, in-situ activation	1:2	550	0.34	0.26	130F/g at 2mV/s	S1
Nafion (\$4.8/g)	Co-spun with PAN, in-situ activation	4:1	1600	1.33	0.53	210F/g at 1A/g	S2
Phenylsilane (\$8.1/g)	Co-spun with PAN, in-situ activation	1:1	568	Not reported	Not reported	160F/g at 20mA/cm^2	S3
KOH (\$0.8/g)	Ex-situ activation	3:1 (KOH to carbon nanofibers)	1520	0.71	0.54	202F/g at 1mA/cm^2	S4
H_3PO_4 (\$0.89/g)	Co-spun with PAN, in-situ activation	1:50-1:10	709	0.356	0.278	132F/g at 2mV/s and 156F/g at 0.5A/g	This work

Note: The chemical prices were inquired from Sigma-Aldrich, with 99% purity. PAN price: \$1.85/g, and DMF price: \$0.04/g

References

S1. C. Kim, B. T. N. Ngoc, K. S. Yang, M. Kojima, Y. A. Kim, Y. J. Kim, M. Endo and S. C. Yang, *Adv. Mater.*, **2007**, 19,2341.

S2. C. Tran and V. Kalra, *J. Power. Sources.*, 2013, **235**, 289.

S3. Bo. Kim, K. S.Yang, Y. H. Bang and S. R. Kim,Materials Letters, 2011, **65**, 3479

S4. V. Barranco, M. A. Lillo-Rodenas, A. Linares-Solano, A. Oya, F. Pico, J. Ibanéz,

F. Agullo-Rueda, J. M. Amarilla and J. M. Rojo, *J. Phys. Chem. C*., 2010, **114**, 10302.