

Author's Accepted Manuscript

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PII: S2211-2855(17)30077-0
DOI: <http://dx.doi.org/10.1016/j.nanoen.2017.02.007>
Reference: NANOEN1783

To appear in: *Nano Energy*

Received date: 28 December 2016
Revised date: 24 January 2017
Accepted date: 6 February 2017

Cite this article as: Jie Yang, Haolin Wu, Min Zhu, Wenju Ren, Yuan Lin, Haibiao Chen and Feng Pan, Optimized Mesopores Enabling Enhanced Rate Performance in Novel Ultrahigh Surface Area Meso-/microporous Carbon for Supercapacitors, *Nano Energy*, <http://dx.doi.org/10.1016/j.nanoen.2017.02.007>

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Optimized Mesopores Enabling Enhanced Rate Performance in Novel Ultrahigh Surface Area Meso-/microporous Carbon for Supercapacitors

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Abstract

Increasing both the energy density and the power density of supercapacitors is an important but challenging research subject. Porous carbon with extremely high surface, such as activated carbon, is a key engineering material for current supercapacitor technology. Here we report optimized mesopores enabling significantly enhanced rate performance in hierarchically meso-/microporous carbon with a ultrahigh surface area for supercapacitors, which is prepared by a new *in-situ* template method to exhibit a high mesopore volume proportion (66.0%), as well as a large pore volume up to $2.47 \text{ cm}^3 \text{ g}^{-1}$, and an ultrahigh specific surface area of $3122 \text{ m}^2 \text{ g}^{-1}$. Polysiloxane was used as a precursor to produce nonporous SiOC, and sequentially NaOH was used to activate SiOC to produce highly porous carbon by removing silica and activating carbon. Hierarchically porous carbon C800 exhibited a high energy density up to 42 Wh kg^{-1} at a power density of 374 W kg^{-1} , and still retained an energy density of 21 Wh kg^{-1} at a high power density of 30 kW kg^{-1} . The superior

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