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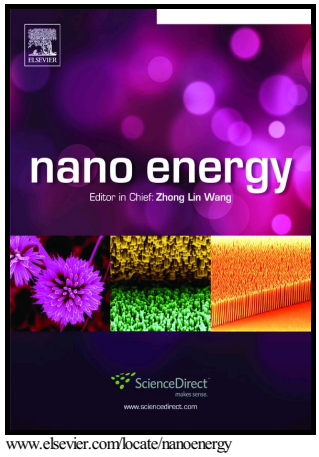

www.elsevier.com/locate/nanoenergy

PII: S2211-2855(17)30629-8
DOI: https://doi.org/10.1016/j.nanoen.2017.10.025
Reference: NANOEN2259

To appear in: *Nano Energy*

Received date: 8 September 2017
Revised date: 6 October 2017
Accepted date: 9 October 2017

Cite this article as: Chun Wang, Faxing Wang, Zaichun Liu, Yujuan Zhao, Yong Liu, Qin Yue, Hongwei Zhu, Yonghui Deng, Yuping Wu and Dongyuan Zhao, N-doped Carbon Hollow Microspheres for Metal-free Quasi-solid-state Full Sodium-ion Capacitors, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2017.10.025

N-doped Carbon Hollow Microspheres for Metal-free Quasi-solid-state Full Sodium-ion Capacitors

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Abstract

N-doped carbon hollow microspheres have been synthesized by a facile interfacial sol-gel coating process using resorcinol/formaldehyde as the carbon precursor and ethylenediamine (EDA) as both the base catalyst and nitrogen precursor. They possessed uniform size of ~ 120 nm in diameter with porous shells as thin as ~ 10 nm. The BET specific surface area and pore volume were measured to be 267 $m^2 \cdot g^{-1}$ and 1.2 $cm^3 \cdot g^{-1}$, respectively. The nitrogen doping of 8.23 *wt* % in carbon matrix could be achieved without sacrificing the hollow spherical morphology. Density functional theory (DFT) calculation results clearly reveal that N-doping could significantly change the interaction sites and enhance the adsorption of PF_6^- ions towards carbon framework. Quasi-solid-state full sodium-ion capacitors employing the nanoporous