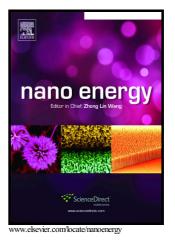
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## N-doped Carbon Hollow Microspheres for Metal-free Quasi-solid-state Full Sodium-ion Capacitors

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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<sup>2</sup>·g<sup>-1</sup> and 1.2 cm<sup>3</sup>·g<sup>-1</sup>, 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<sub>6</sub><sup>-</sup> ions towards carbon framework. Quasi-solid-state full sodium-ion capacitors employing the nanoporous

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