

Nitrogen co-doped ordered micro/meso porous carbon from SBA-15 CVD for supercapacitor electrode

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Abstract

It is getting stuck for supercapacitor electrode materials to satisfy the growing need for energy storage, which still keep high specific capacitance with ultra-high current density. Controllable synthesis strategies are of great importance for preparing materials with good performance for supercapacitor applications. Herein, we developed a simple but highly efficient hard template method to synthesize nitrogen-doped ordered micro/meso porous carbon (NOPC) with acetonitrile chemical vapor deposition (CVD) and SBA-15 as template. The NPC material has large specific surface area ($815 \text{ m}^2 \cdot \text{g}^{-1}$) and high nitrogen doping content (7 at%). When used as an active supercapacitor electrode material, it exhibits specific capacitance of $300 \text{ F} \cdot \text{g}^{-1}$ at $5 \text{ A} \cdot \text{g}^{-1}$ in 6 M KOH and 90% capacitance retention at $5 \text{ A} \cdot \text{g}^{-1}$ after 20 000 cycles. The ordered 1~5/6~10 nm micro/mesopores contribute the transportation and storage of electrons, respectively, and the N-functional groups contribute the pseudo capacitance. The new synthetic method is promising for industry application in production of NOPC for energy storage.