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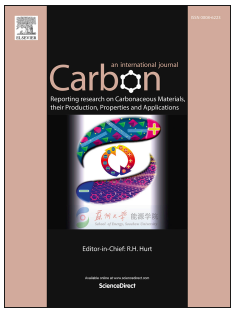

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Hierarchically nanostructured hollow carbon nanospheres for ultra-fast and long-life energy storage

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Abstract

We report on the successful application of porous hollow carbon nanospheres consisting of graphitic shells with a hierarchical porosity that were obtained by carbonizing an iron-containing commercially available metal-organic framework, as active material for supercapacitors. The influence of basic key parameters, such as the degree of graphitization and the accessible surface area of the carbons obtained at different temperatures, on the electrochemical performance is discussed in-depth. A high specific capacitance of 91 F g^{-1} in an aqueous electrolyte and 156 F g^{-1} using an ionic liquid is achieved. Furthermore a very steady specific capacitance over the course of 10000 charge-discharge cycles is demonstrated. In addition, electrochemical impedance spectroscopy studies revealed that these carbons can feature a stable performance over several orders of magnitude of frequency, which render them interesting candidates for future electrochemical energy storage systems.