Facile Synthesis of three-dimensional Carbon Nanocages with Hierarchical Porous Structures as Supercapacitor Electrode Materials

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doi: 10.20964/2019.07.62

Received: 2 March 2019 / Accepted: 5 May 2019 / Published: 10 June 2019

Hierarchical carbon with a three-dimensional (3D) structure has become a promising electrode material for supercapacitors due to its excellent rate capability. High surface area hierarchical structure carbon nanocages (HHNCs) were prepared using magnesium oxide as a template with in situ chemical activation. These materials feature a 3D network structure interconnected by carbon nanocages, a high specific surface area ($2073 \text{ m}^2 \text{ g}^{-1}$), a high pore volume ($3.17 \text{ cm}^3 \text{ g}^{-1}$) and a multiscale pore size distribution. Because of the synergistic effects of these advantages, as supercapacitor electrode materials, HHNCs show excellent electrochemical performance with a high specific capacitance (276 F g^{-1} at 0.05 A g^{-1}) and an excellent rate capability (205 F g^{-1} at 20 A g^{-1}). This makes HHNCs promising supercapacitor electrode materials with many potential applications.

Keywords: Supercapacitor; Carbon nanocages; Hierarchical structure; Hard template; In situ chemical activation.

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