Effect of Different Conductive Additives on the Electrochemical Properties of Mesoporous MnO₂ Nanotubes

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MnO₂ as an environmental benignity material has been of great interest for supercapacitors due to its unique properties leading to improved performances. Herein we describe the effects of different conductive agent to improve the electrochemical properties of MnO₂ nanotubes. Three typical conductive additives: carbon black, carbon nanotubes, and graphene are chosen to mix with MnO₂ nanotubes in the working electrodes. The specific conductivities of MnO₂@carbon black particles electrode, MnO₂@carbon nanotubes electrode, and MnO₂@graphene electrode at the current density 1 A g⁻¹ are 244.8 F g⁻¹, 190.2 F g⁻¹, and 114.1 F g⁻¹ respectively. Furthermore, MnO₂@carbon nanotubes electrode possesses an electrochemical capacitance as high as 297.5 F g⁻¹ at the current density 0.5 A g⁻¹, which can be put down to these soft thin nanotubes can be intertwined with each other to form a powerful network to provide conduction. In principle, the high specific capacitance and stable structure of the MnO₂@carbon nanotubes electrode ensures its potential for the applications in supercapacitors and other microelectronics.

Keywords: graphene; carbon blacks; carbon nanotubes; manganese dioxide nanotubes; supercapacitors

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