Electrochemical Performance of $\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$ Composite Materials for Supercapacitors

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doi: 10.20964/2016.07.40

Received: 4 April 2016 / Accepted: 18 May 2016 / Published: 4 June 2016

In this paper, a new type of supercapacitor electrode material is synthesized using graphene, carbon black and Mn_3O_4 ($\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$). This composite material can make full use of the high conductivity of the graphene and the high specific surface area of the carbon black to improve the conductivity, specific capacitance and cycle stability of the Mn_3O_4 . At 0.1A/g current density, the specific capacitance of the $\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$ composite is 661F/g, which is 4 times higher than that of Mn_3O_4 (165F/g) under the same current density. The CV curves of the $\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$ composite are maintained in the shape of an approximately rectangular shape, and have a fast current response rate. Under the high current density of 30A/g, after 5000 cycles of charge-discharge test, 69.2% of the initial specific capacitance is still retained for the $\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$ composite, while the specific capacitance of the Mn_3O_4 only remains 63.6%, after the same process. According to the EIS test, the charge transfer resistance and Warburg resistance of the $\text{Mn}_3\text{O}_4/\text{G}/\text{CB}$ composites are all less than Mn_3O_4 , which is attributed to the addition of the graphene and carbon black.

Keywords: Supercapacitor; Mn_3O_4 ; Carbon black; Graphene; Electrode Materials

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