Short Communication

Preparation and Capacitance Properties of Dumbbell-Shaped Mn_2O_3 Mesocrystal as High-Performance Supercapacitors

Guiling Wang^{1,*}, Qiannan Li¹, Mengyu Du¹, Junming Chen¹, Tingting Liu², Xinyu Wang¹,
Weimin Zhang¹, Xuchun Wang¹

¹ College of Chemical and Materials Engineering, Anhui Science and Technology University, Donghua Road No. 9, Fengyang, 233100, China;

² Northeast Petroleum University at Qinhuangdao, Qinhuangdao 066004, China)

*E-mail: wangguilingcg@126.com

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Dumbbell-shaped Mn_2O_3 was synthesized by annealing hydrothermal products with a precisely controlled concentration of ethanol. When the ratio of ethanol increased, various Mn_2O_3 nanostructures with different morphologies, ranging from a dumbbell-like shape to a spherical shape, were obtained. Dumbbell-like Mn_2O_3 had a mesocrystal structure, which was formed by an orderly stacking of nanocrystallites. In addition, with a water to ethanol volume ratio of 1:1, Mn_2O_3 exhibited the highest specific capacitance of 273.1 F g^{-1} at a current density of 1 A g^{-1} in 6 M KOH electrolyte and a good capacitance retention of 97.7% after 1000 cycles. Furthermore, the noninsertion and insertion capacities of the sample materials were further analysed. The total maximum capacitance and the minimum capacitance were calculated to be 411.5 F g^{-1} and 230.5 F g^{-1} , respectively; moreover, it could be calculated that the insertion capacity percentage was 44%. This work provides new innovative insights to improve the capacitance performance of a Mn_2O_3 material by optimizing the crystal structure.

Keywords: supercapacitor; Mn_2O_3 ; dumbbell-like shape; mesocrystal; electrochemical performance

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