Assembly of Mn₃O₄/carbon Black Composite and Its Supercapacitor Application

Xugang Ren¹, Junwei An², Shaohui Yan^{1,*}, Lizhen Gao¹, Shengming Xu^{2,*}, Xiaomin Wang³, Guoqiang Wei³

¹ College of Environmental Science and Engineering, Taiyuan University of Technology, Taiyuan, 030024, China

² Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 100084, China

³ Laboratory of Green Energy Materials and Storage Systems, Taiyuan University of Technology, Taiyuan, 030024, China

*E-mail: shyan@buaa.edu.cn

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In this article, Mn₃O₄ nanoparticles are prepared directly on a commercial high conductive carbon black (CB) to form a Mn₃O₄/carbon black composite (Mn₃O₄/CB) by a chemical synthesis method. The TEM results indicate that the microstructure of the Mn₃O₄ nanoparticles in the Mn₃O₄/CB composite is in good order, and they are distributed on the surface of carbon black uniformly. The electrochemical properties revealed from the rectangularity of the cyclic-voltammogram loops of the composite electrode are satisfactory. These results indicate the almost-ideal capacitive behavior of the Mn₃O₄/CB composite. The electrochemical tests indicate that the specific capacitance of the Mn₃O₄/CB composites reaches 720 F/g at the current density of 0.1 A/g in 2 M Na₂SO₄ solution, which is approximately 4.36 times than that of the pristine Mn₃O₄ (165 F/g). The Mn₃O₄/CB composite electrode shows excellent capacity retention (91.6%) after 5000 cycles at the current density of 30 A/g.

Keywords: supercapacitor; Mn₃O₄; carbon black; electrode materials

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