Synthesis and Application of MnO₂/PANI/MWCNT Ternary Nanocomposite as an Electrode Material for Supercapacitors

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In this article, a ternary nanocomposite comprising MnO₂/PANI/MWCNTs was synthesized by a facile chemical method for application as an electrode material for supercapacitors. The morphology and microstructure of the nanocomposite were examined by using energy dispersive spectroscopy, X-ray diffraction, Fourier transform infrared spectrometry, field emission scanning electron microscopy and transmission electron microscopy. The electrochemical behavior of the ternary nanocomposite was investigated in a 1 M KOH aqueous solution by cyclic voltammetry, charge-discharge (CD) testing and electrochemical impedance spectroscopy. The ternary MnO₂/PANI/MWCNT nanocomposite demonstrated a specific capacitance of 395.0 F·g⁻¹ and can still maintain 72% of its capacitance after 1000 CD cycles at a current density of 1 A·g⁻¹. The excellent electrochemical properties of the MnO₂/PANI/MWCNT nanocomposite may arise from the high conductivity and the synergistic effect of the ternary structure.

Keywords: Supercapacitor, Multi-walled carbon nanotube, Polyaniline, Manganese dioxide, Electrochemical performance

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