Preparation of Manganese Dioxide/Polypyrrole Composite by W/O Miniemulsion and Its Electrochemical Performance

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A new and convenient synthetic route of W/O miniemulsion technology was used to prepare manganese dioxide/polypyrrole (MnO₂/PPy) composites. The structures and morphologies were characterized by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), high resolution transmission electron microscope (HRTEM) and thermogravimetric analysis (TGA). The results indicated that the MnO₂/PPy composite was spheroid and had average particle size of ~200 nm. The relationship between stability of the miniemulsion and the hydrophilic-lipophilic balance (HLB) was firstly evaluated. Moreover, the effects of HLB, KMnO₄ amount and reaction time on electrochemical properties of MnO₂/PPy composites were studied by cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), electrochemical impedance spectroscopy (EIS). It was found that the as-synthesized MnO₂/PPy composites exhibited specific capacitance (SC) of 288.7 F g⁻¹ at a current density (c.d.) of 0.5 A g⁻¹. The SC was still retained 91.3% after 1000 cycles at 1 A g⁻¹. Therefore, this research proposed a W/O miniemulsion method for preparing the MnO₂/PPy composites with well electrochemical properties.

Keywords: MnO₂/PPy composites; W/O miniemulsion; HLB; Electrochemical

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