Preparation of Poly(7-formylindole)/carbon Fibers Nanocomposites and Their High Capacitance Behaviors

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Polyindoles belonging to the fused-ring family have attracted extensive investigation as promising materials due to their unique physical and electrochemical properties. Herein, poly(7-formylindole) (PFIIn) film was firstly synthesized electrochemically on carbon fibers by direct anodic oxidation of 7-formylindole in acetonitrile solution containing 0.1 M LiClO₄. FT-IR spectra indicated that the polymerization site of monomer happened at the C₂ and C₃ positions of indole ring. The morphology of PFIIn film on carbon fibers was investigated through SEM observation, which indicated that PFIIn film tightly wrapped over carbon fibers (PFIIn/CF). Electrochemical results indicated that PFIIn/CF electrode showed a remarkable specific capacitance of 637 F g⁻¹ at 20 A g⁻¹. The energy density reached about 42 Wh kg⁻¹ at a high power density of 21 kW kg⁻¹. Furthermore, PFIIn/CF still maintained about 74.1% of initial specific capacitance and 100% coulombic efficiency after 1000 cycles. These results revealed that PFIIn/CF was a promising electrode material for the flexible supercapacitors application.

Keywords: Supercapacitors; Conducting polymer; Poly(7-formylindole); Carbon fibers; Capacitance performance

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