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The impact of Fe^{3+} doping on the flexible polythiophene electrodes for supercapacitors

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Abstract

Fe^{3+} doping is used to enhance the capacity of polythiophene as supercapacitor electrode and the flexible Fe^{3+} doped PTh electrode on carbon cloth is prepared with an electrochemical deposition method. The successful doping of Fe^{3+} is confirmed by IR, XPS, and EDS measurements. The electrochemical performance of the PTh electrode is evaluated using cyclic voltammetry, galvanostatic charge/discharge technique, and electrochemical impedance spectroscopy in acidic aqueous electrolyte. The pristine PTh exhibits specific capacitance of 77.2 F g^{-1} at a current density of 0.5 A g^{-1}. After Fe^{3+} doping, the specific capacitance is improved to 108.1 F g^{-1} and the retention rate also improved from 7.8% to 21.2% after 1000 charge-discharge circles.

Keywords: Supercapacitor; doping; polythiophene; Fe; electrode

1. Introduction

Electrochemical capacitors, also known as supercapacitors or ultracapacitors, have received interests as a novel environmentally friendly power storage device in recent

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