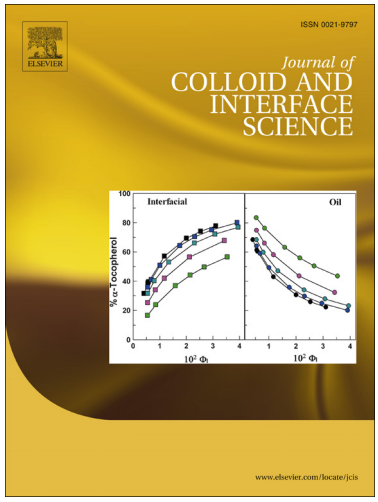

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Manganese oxide nanowires wrapped with nitrogen doped carbon layers for high performance supercapacitors

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Abstract:

In this study, manganese oxide nanowires wrapped by nitrogen-doped carbon layers (MnO_x@NCs) were prepared by carbonization of poly(*o*-phenylenediamine) layer coated onto MnO_2 nanowires for high performance supercapacitors. The component and structure of the MnO_x@NCs were controlled through carbonization procedure under different temperatures. Results demonstrated that this composite combined the high conductivity and high specific surface area of nitrogen-doped carbon layers with the high pseudo-capacitance of manganese oxide nanowires. The as-prepared MnO_x@NCs exhibited superior capacitive properties in 1 M Na_2SO_4 aqueous solution, such as high conductivity (4.167×10^{-3} S cm^{-1}), high specific capacitance (269 F g^{-1} at 10 mV s^{-1}) and long cycle life (134 F g^{-1} after 1200 cycles at a scan rate of 50 mV s^{-1}). It is reckoned that the present novel hybrid nanowires can serve as a promising electrode material for supercapacitors and other electrochemical devices.

Keywords: Manganese oxide, Poly(*o*-phenylenediamine), Nitrogen-doped carbon, Supercapacitor

Introduction:

Supercapacitors have higher power density compared to capacitors and better cycle life than batteries, thus they can meet the demands for various applications, such as consumer electronics, or industrial supporting powers. Nowadays, considerable efforts have been devoted to the researches of electrode materials for supercapacitors, such as transition metal oxides, conducting polymers and carbon materials. Carbon materials, most commonly activated carbons (ACs) and carbon nanotubes (CNTs), exhibit high double-layer capacitance, high electronic conductivity, high specific