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Self-assembly of 3D hierarchical $MnMoO_4/NiWO_4$ microspheres for high-performance supercapacitor

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ABSTRACT

A simple synthesize method of hybrid transition metal oxides is important for the application of electrodes materials. In this work, we report one-pot hydrothermal method to synthesize 3D hierarchical $MnMoO_4/NiWO_4$ microspheres. Notably, the 3D hierarchical $MnMoO_4/NiWO_4$ microspheres electrodes with a $MnMoO_4/NiWO_4$ molar ratio of 4:3 present outstanding electrochemical performance. The excellent specific capacitance of the hybrid materials is 598 F g^{-1} at a discharge current density of 1 A g^{-1} and the capacitance retains 82% of its initial capacitance even after 5000 cycles, which are attributed to the obtained 3D hierarchical $MnMoO_4/NiWO_4$ microspheres are constituted by self-assembly $MnMoO_4$ nanoflakes and $NiWO_4$ nanoparticals and feature with abundant transportation shortcuts for electrolyte ions and excellent electrochemical performance. The results reveal that the 3D hierarchical $MnMoO_4/NiWO_4$ microspheres have great application prospect for electrochemical energy storage and the quick and facile method provides a new avenue for the preparation of hybrid materials.

Key Words: 3D hierarchical $MnMoO_4/NiWO_4$ microspheres; One-pot hydrothermal method; Self-assembly; Electrochemical performance

1. Introduction

Over the past few years, tremendous efforts have been made to supercapacitors for their potential applications in different types of electronic systems[1, 2]. Supercapacitors usually include electrical double layer capacitors (EDLCs) and pseudocapacitors due to the difference of charge storage mechanism[3]. Specifically, pseudocapacitors supply standout electrochemical performance because of their fast and strong reversible redox reactions[4].

Nowadays, extensive attentions have been paid to the structural design and processing method of electrode materials which are an important role for the development of