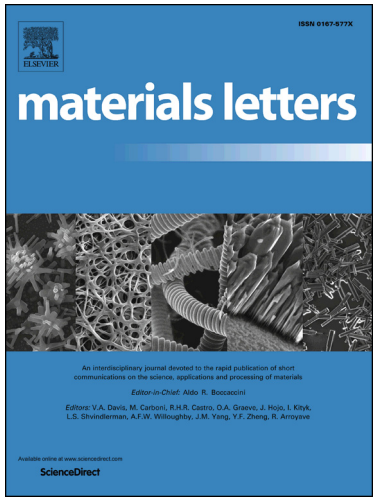

Co_3S_4 nanoneedles decorated on $NiCo_2O_4$ nanosheets for high-performance asymmetric supercapacitors

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Co_3S_4 nanoneedles decorated on $NiCo_2O_4$ nanosheets for high-performance asymmetric supercapacitors

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Abstract

Co_3S_4 nanoneedle decorated $NiCo_2O_4$ nanosheets are successfully prepared by a two-step hydrothermal process for supercapacitors. The $NiCo_2O_4$ nanosheets are served as ideal backbones to enhance the surface area and provide more electroactive sites for faradaic reaction. The optimized $NiCo_2O_4/Co_3S_4$ electrode shows a high specific capacity of 1468 F g^{-1} at the current density of 1 A g^{-1}. When assembled an asymmetric supercapacitor, the device exhibits high energy density of 14.0 Wh kg^{-1} at 400 W kg^{-1}, and retains 84.7% of the capacity after 3000 cycles.

Keywords: Supercapacitor, Co_3S_4 nanoneedles, $NiCo_2O_4$ nanosheets, Electrodes

Introduction

As a new-type energy storage devices, supercapacitors show higher power density than batteries and higher energy density than traditional dielectric capacitors, which have drawn significant research attention in recent years. [1,2] Based on the charge-storage mechanism, pseudocapacitor always show higher capacity than double layer capacitor, and the electrode material plays an important role in energy storage. Transition metal oxides are a kind of ideal pseudocapacitor electrode materials due to their various oxidation states for the redox reaction