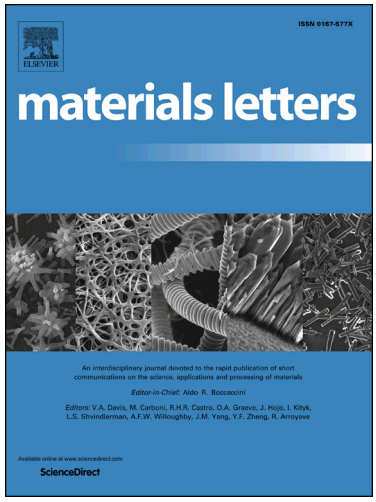

Facile synthesis of Ni_3S_2 and CoS composite on nickel foam for high performance supercapacitor electrode materials

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Facile synthesis of Ni_3S_2 and CoS composite on nickel foam for high performance supercapacitor electrode materials

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Abstract

A facile and cost effective way has been developed to fabricate a unique structure of Ni_3S_2 and CoS (CNS) composite. CNS composite are synthesized on the surface of nickel foam (NF) using a hydrothermal process. NF acts as both a substrate and Ni source for composite. CNS are directly applied as the electrode for supercapacitors. XRD results indicate the presence of Ni_3S_2, CoS, and Ni phases in the sample. SEM results show that the CNS consist of interweaved nanoplates with average diameter of 15 μm and a thickness of 250 nm. Electrochemical measurements indicate the CNS have the specific capacitance of 4.73 F m^{-2} at a current density of 1 mA cm^{-2}. When the current density increases from 1 mA cm^{-2} to 20 mA cm^{-2}, 63.4% capacitance is retained. Thus, the facile, low-cost and novel synthesis method and outstanding performance make the CNS an ideal electrode material for the electrochemical energy storage devices.

Keywords: Supercapacitor; Electrochemical properties; Energy storage and conversion

1. Introduction

Recently, with the development of novel energy conversion and storage systems, more and more people pay attention to nanoscience and nanotechnology as alternative energy sources to achieve a clean and sustainable world due to the depletion fossil fuels[1]. Supercapacitors, also called electrochemical capacitors, have been recognized as the most important part of various energy storage technologies[2]. Compared with traditional process, the electrochemical supercapacitors are safe and