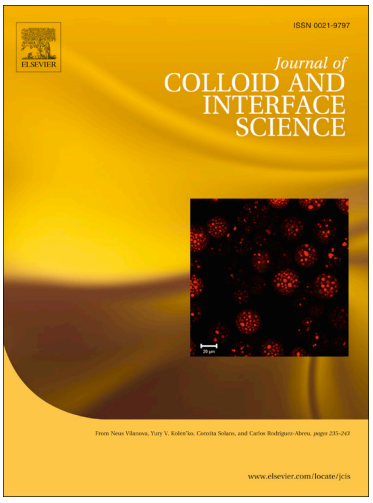

Microwave synthesis of three-dimensional nickel cobalt sulfide nanosheets grown on nickel foam for high-performance asymmetric supercapacitors

Fangping Wang, Guifang Li, Jinfeng Zheng, Jing Ma, Caixia Yang, Qizhao Wang

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Microwave synthesis of three-dimensional nickel cobalt sulfide nanosheets grown on nickel foam for high-performance asymmetric supercapacitors

Fangping Wang*, Guifang Li, Jinfeng Zheng, Jing Ma, Caixia Yang, Qizhao Wang

Key Laboratory of Eco-Environment-Related Polymer Materials, Ministry of Education of China, Key Laboratory of Gansu Polymer Materials, College of Chemistry and Chemical Engineering, Northwest Normal University, Lanzhou 730070

*Corresponding author. E-mail: wangfp@nwnu.edu.cn

Abstract: A facile and cost-effective microwave method is developed to prepare ternary nickel cobalt sulfide ($NiCo_2S_4$) interconnected nanosheet arrays on nickel foam (NF). When acting as an electrochemical supercapacitor electrode material, the as-prepared $NiCo_2S_4$/NF shows a high specific capacitance of 1502 F g^{-1} at a current density of 1 Ag^{-1}, and outstanding cycling stability of 91% capacitance retention after 8000 cycles. In addition, a asymmetric supercapacitor (ASC) is composed of $NiCo_2S_4$/NF as positive electrode and activated carbon as negative electrode, which exhibits a high energy density of 34.7 Wh kg^{-1} at a power density of 750 W kg^{-1} and long-term cyclic stability (83.7% capacity retention after 8000 cycles). Even at a high power density of 15 kW kg^{-1}, it still remains an energy density of 17.9 Wh kg^{-1}, which is able to light up a light-emitting diode. These findings provide a new and facile approach to fabricate high-performance electrode for supercapacitors.

Keywords: $NiCo_2S_4$ nanosheet; Microwave method; Asymmetric supercapacitor; High energy density

1. Introduction

In recent years, the rapidly growing commercial markets in electric vehicles and