Facile Synthesis of Ultrathin CuCo_2S_4 Nanosheets for High-Performance Supercapacitors

Liang Chen, Yinze Zuo, Yu Zhang and Yanmin Gao^{*}

School of Materials Science and Engineering, Jiangsu University of Science and Technology, Jiangsu, Zhenjiang 212003, China

^{*}E-mail: gymjust@126.com

doi: 10.20964/2018.02.48

Received: 13 October 2017 / Accepted: 9 December 2017 / Published: 28 December 2017

Two-dimensional (2D) structural CuCo_2S_4 exhibits great potential for applications in the renewable energy and catalysis fields. However, the fabrication of CuCo_2S_4 nanosheets remains a great challenge, and studies focussed on CuCo_2S_4 nanosheets used for supercapacitors are seldom reported. In this work, for the first time, polyvinylpyrrolidone (PVP) was used to level the sulfurization rate and reactivity of Cu and Co ions in a glycerol solution. As a result, the crystallographic growth direction of CuCo_2S_4 was controlled to be a sheet. Furthermore, the obtained CuCo_2S_4 nanosheets mainly exhibited an ultrathin thickness of approximately 15 nm. From the electrochemical measurements, the specific capacitance of the CuCo_2S_4 nanosheet was 1742 F g^{-1} at a current density of 10 A g^{-1} . The capacitance retention was 93.4% at 10 A g^{-1} for 2000 cycles. In addition, the CuCo_2S_4 nanosheet//rGO asymmetric supercapacitor exhibited an energy density of approximately 45.6 Wh kg^{-1} at a power density of 748.2 W kg^{-1} . After 5000 cycles at a current density of 10 A g^{-1} , the capacitance retention was 91.7%.

Keywords: supercapacitors, CuCo_2S_4 nanosheet, polyvinylpyrrolidone, glycerol, solvothermal method

[FULL TEXT](#)

© 2018 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).