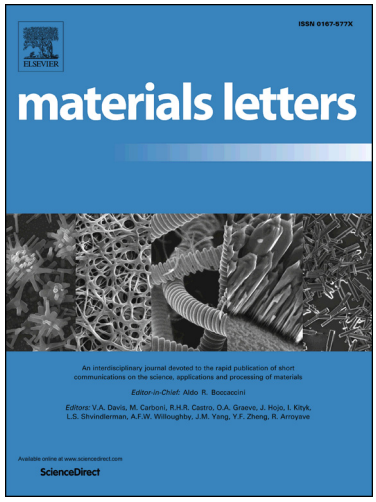
Accepted Manuscript



Nitrogen-doped double-layer graphite supported $CuCo_2S_4$ electrode for high-performance asymmetric supercapacitors

Liang Chen, Rui Lin, Chao Yan

PII: S0167-577X(18)31542-8
DOI: https://doi.org/10.1016/j.matlet.2018.09.153
Reference: MLBLUE 25021

To appear in: *Materials Letters*

Received Date: 7 August 2018
Revised Date: 22 September 2018
Accepted Date: 28 September 2018

Please cite this article as: L. Chen, R. Lin, C. Yan, Nitrogen-doped double-layer graphite supported $CuCo_2S_4$ electrode for high-performance asymmetric supercapacitors, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.09.153

Nitrogen-doped double-layer graphite supported $CuCo_2S_4$ electrode for high-performance asymmetric supercapacitors

Liang Chen [a], Rui Lin [a], Chao Yan [b]*

[a] *School of Automotive Studies, Tongji University, Shanghai 201804, China*

[b] *School of Materials Science and Engineering, Jiangsu University of Science and Technology, Jiangsu, Zhenjiang 212003, China*

* Corresponding author.

E-mail address: chaoyan@just.edu.cn (C. Yan)

Abstract

$CuCo_2S_4$ synthesized on the nitrogen-doped double-layer graphite (NDG) inter-layer revealed more uniform and smaller size than synthesized directly on Ni foam. From electrochemical measurements, the specific capacitance of $CuCo_2S_4$@NDG electrode was 1244 F g^{-1} at a current density of 50 A g^{-1}, which was twice higher than the $CuCo_2S_4$@Ni electrode. In addition, the reduced graphene oxide (rGO) was used to assemble $CuCo_2S_4$@NDG//rGO asymmetric supercapacitor, revealing a high energy density (58.4 W h kg^{-1}) for practical applications. Significantly, the NDG inter-layer improved the properties of asymmetric supercapacitor at high-rate and high energy density conditions effectively.

Keywords: Energy storage and conversion; Supercapacitor; $CuCo_2S_4$; Graphite; Inter-layer; Composite materials

1. Introduction

Although supercapacitors exhibit superior power density and long-term stability, their further applications are still limited by lower energy density than that of batteries. So far, numerous efforts have been devoted to enhance energy density [1,2], and these strategies were closely related to the properties of electrode materials [3-5]. However, seldom researches focus on the effect of inter-layer, which locate between the current collector and