

High-performance pouch-type hybrid  
supercapacitor based on hierarchical NiO-Co<sub>3</sub>O<sub>4</sub>-  
NiO composite nanoarchitectures as an advanced  
electrode material

S. Chandra Sekhar, Goli Nagaraju, Jae Su Yu



PII: S2211-2855(18)30177-0  
DOI: <https://doi.org/10.1016/j.nanoen.2018.03.037>  
Reference: NANOEN2585

To appear in: *Nano Energy*

Received date: 11 January 2018  
Revised date: 6 March 2018  
Accepted date: 12 March 2018

Cite this article as: S. Chandra Sekhar, Goli Nagaraju and Jae Su Yu, High-performance pouch-type hybrid supercapacitor based on hierarchical NiO-Co<sub>3</sub>O<sub>4</sub>-NiO composite nanoarchitectures as an advanced electrode material, *Nano Energy*, <https://doi.org/10.1016/j.nanoen.2018.03.037>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# High-performance pouch-type hybrid supercapacitor based on hierarchical NiO-Co<sub>3</sub>O<sub>4</sub>-NiO composite nanoarchitectures as an advanced electrode material

S. Chandra Sekhar, Goli Nagaraju and Jae Su Yu\*

*Department of Electronic Engineering, Institute for Wearable Convergence Electronics, Kyung Hee University, 1 Seocheon-dong, Giheung-gu, Yongin-si, Gyeonggi-do 446-701, Republic of Korea.*

\*Address correspondence to. Tel: +82-31-201-3820; Fax: +82-31-206-2820. jsyu@khu.ac.kr

## Abstract

The core-shell-like architectures consisting of NiO nanosheet arrays grafted Co<sub>3</sub>O<sub>4</sub>-NiO fish thorns-like nanostructures (NiO NSAs@Co<sub>3</sub>O<sub>4</sub>-NiO FTNs) were successfully prepared by a simple solution-based method. With an aid of ammonium fluoride (NH<sub>4</sub>F), the morphological evolution of Co<sub>3</sub>O<sub>4</sub>-NiO FTNs was elaborated effectively. Subsequently, the NiO NSAs were uniformly decorated on Co<sub>3</sub>O<sub>4</sub>-NiO FTNs to form a core-shell-like composite material for positive electrode in hybrid supercapacitors (HSCs). The core-shell-like composite exhibited a large surface area with high open porous channels, which intend to deliver high areal capacity of 313.9  $\mu\text{Ah}/\text{cm}^2$  (at 4  $\text{mA}/\text{cm}^2$ ) in 1 M KOH, and it is 1.84 and 3.9 times higher than solitary Co<sub>3</sub>O<sub>4</sub>-NiO FTNs and solitary NiO NSAs electrodes. Furthermore, we fabricated a pouch-type HSC with core-shell-like NiO NSAs@Co<sub>3</sub>O<sub>4</sub>-NiO FTNs as a positive electrode and activated carbon as a negative electrode in aqueous alkaline electrolyte. At a current density of 2  $\text{mA}/\text{cm}^2$ , the fabricated HSC provides high areal capacitance of 623.5  $\text{mF}/\text{cm}^2$  with a maximum energy density of 216.1  $\mu\text{Wh}/\text{cm}^2$  and power density of 27.7  $\text{mW}/\text{cm}^2$ . In addition, the HSC showed

Download English Version:

<https://daneshyari.com/en/article/7952597>

Download Persian Version:

<https://daneshyari.com/article/7952597>

[Daneshyari.com](https://daneshyari.com)