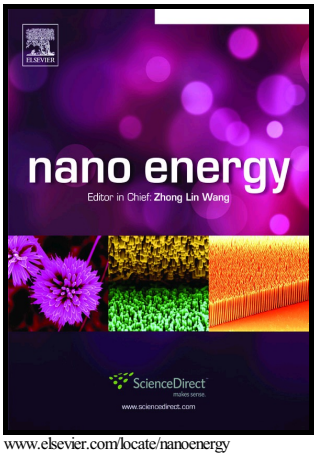

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S. Chandra Sekhar, Goli Nagaraju, Jae Su Yu

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High-performance pouch-type hybrid supercapacitor based on hierarchical NiO-Co_3O_4-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_3O_4-NiO fish thorns-like nanostructures (NiO NSAs@Co_3O_4-NiO FTNs) were successfully prepared by a simple solution-based method. With an aid of ammonium fluoride (NH_4F), the morphological evolution of Co_3O_4-NiO FTNs was elaborated effectively. Subsequently, the NiO NSAs were uniformly decorated on Co_3O_4-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 μAh/cm^2 (at 4 mA/cm^2) in 1 M KOH, and it is 1.84 and 3.9 times higher than solitary Co_3O_4-NiO FTNs and solitary NiO NSAs electrodes. Furthermore, we fabricated a pouch-type HSC with core-shell-like NiO NSAs@Co_3O_4-NiO FTNs as a positive electrode and activated carbon as a negative electrode in aqueous alkaline electrolyte. At a current density of 2 mA/cm^2, the fabricated HSC provides high areal capacitance of 623.5 mF/cm^2 with a maximum energy density of 216.1 μWh/cm^2 and power density of 27.7 mW/cm^2. In addition, the HSC showed