Hierarchical MoS₂ Nanosheets - FeCo₂O₄ Nanowires on Flexible Carbon Cloth Substrate for High-Performance Flexible Supercapacitors

Selvaraj Shanthi^{1,2}, Hiroya Ikeda¹, Indrajit M. Patil³, Bhalchandra kakade³, Yasuhiro Hayakawa¹, Suru Ponnusamy², Chellamuthu Muthamizhchelvan^{2*}

¹ Research Institute of Electronics, Shizuoka University, Japan.

² Department of Physics and Nanotechnology, SRM Institute of Science and Technology, Kattankulathur, India.

³ SRM Research Institute, SRM Institute of Science and Technology, Kattankulathur, India.

*E-mail: selvancm@gmail.com

doi: 10.20964/2019.06.70

Received: 17 February 2019 / Accepted: 9 April 2019 / Published: 10 May 2019

In this work, the hybrid binder-free supercapacitor electrode material of MoS₂ nanosheets - FeCo₂O₄ nanowires on flexible carbon cloth (CC) substrate was fabricated using two-step hydrothermal approach. Initially, FeCo₂O₄ nanowires were synthesized on flexible CC and subsequently, MoS₂ nanosheets were deposited on FeCo₂O₄ nanowires - CC to form hierarchical core-shell nanostructure of hybrid binder-free MoS₂ - FeCo₂O₄ - CC electrode for superior electrochemical performance. The fabricated electrodes were characterized by using X-ray Diffractometer (XRD) analysis, Field Emission - Scanning Electron Microscopy (FE-SEM), Raman Spectroscopy and X-ray Photoelectron Spectroscopy (XPS) analysis. Electrochemical measurements were investigated by using cyclic voltammetry (CV) analysis and electrochemical impedance spectroscopy (EIS) analysis. The hybrid electrode exhibited a superior electrochemical performance with the specific capacitance value of 952 F/g at the scan rate of 5 mV/s and encompass the opportunity of developing flexible energy storage devices with high power yield.

Keywords: binder-free flexible electrodes; hierarchical core-shell nanostructure; flexible carbon cloth substrate; Electrochemical performance

[FULL TEXT](#)

© 2019 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/>).