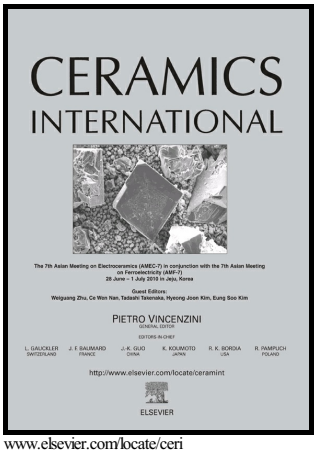

www.elsevier.com/locate/ceri

Synthesis of nitrogen-doped reduced graphene oxide-multiwalled carbon nanotube composite on nickel foam as electrode for high-performance supercapacitor

Fook Yun Ban, Subramaniam Jayabal, Hong Ngee Lim, Hing Wah Lee, Nay Ming Huang

PII: S0272-8842(16)31150-6
DOI: http://dx.doi.org/10.1016/j.ceramint.2016.07.087
Reference: CERI13312

To appear in: *Ceramics International*

Received date: 25 April 2016
Revised date: 23 June 2016
Accepted date: 13 July 2016

Cite this article as: Fook Yun Ban, Subramaniam Jayabal, Hong Ngee Lim, Hing Wah Lee and Nay Ming Huang, Synthesis of nitrogen-doped reduced graphene oxide-multiwalled carbon nanotube composite on nickel foam as electrode for high-performance supercapacitor, *Ceramics International*, http://dx.doi.org/10.1016/j.ceramint.2016.07.087

Synthesis of nitrogen-doped reduced graphene oxide-multiwalled carbon nanotube composite on nickel foam as electrode for high-performance supercapacitor

Fook Yun Ban[1], Subramaniam Jayabal[1], Hong Ngee Lim[2], Hing Wah Lee[3], Nay Ming Huang[1]*

[1]Low Dimensional Materials Research Centre, Department of Physics, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.
[2]Department of Chemistry, Faculty of Science & Functional Device Laboratory, Institute of Advanced Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
[3]Nanoelectronics Cluster, MIMOS Berhad, Technology Park Malaysia, Kuala Lumpur 57000, Malaysia.
**Corresponding author E-mail: huangnayming@um.edu.my (Nay Ming Huang).*

Abstract

An electrode with nitrogen-doped reduced graphene oxide/multiwall carbon nanotubes deposited on nickel foam (N-rGO/MWCNTs/NF) was successfully prepared using a simple one-pot hydrothermal method. The N-rGO/MWCNTs/NF composite was fabricated as an electrode for supercapacitor application. The supercapacitive performance of the N-rGO/MWCNTs/NF electrode was studied using electrochemical impedance spectroscopy, cyclic voltammetry, and galvanostatic charge/discharge in a 6 M KOH electrolyte solution. The N-rGO/MWCNTs/NF electrode showed an enhanced capacitance compared to rGO/MWCNTs/NF, N-rGO/NF, N-MWCNTs/NF, and bare NF electrodes because of nitrogen atom doping and more accessibility of the electrolyte after the incorporation of MWCNTs between the graphene sheets. The N-rGO/MWCNTs/NF electrode showed a specific capacitance of 142.08 F g^{-1} at a current density of 1 A g^{-1} and cycling stability with 76.2% of its initial capacitance after 1000 charge/discharge cycles.

Keywords: Nitrogen atom, reduced graphene oxide, multi-walled carbon nanotubes, nickel foam, supercapacitor.