

# Accepted Manuscript

Full Length Article

Amphiphilic Ligand Exchange Reaction-Induced Supercapacitor Electrodes with High Volumetric and Scalable Areal Capacitances

Donghyeon Nam, Yeongbeom Heo, Sanghyuk Cheong, Yongmin Ko, Jinhan Cho

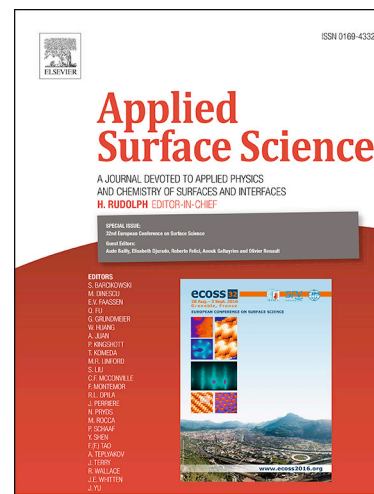
PII: S0169-4332(18)30166-1  
DOI: <https://doi.org/10.1016/j.apsusc.2018.01.153>  
Reference: APSUSC 38292

To appear in: *Applied Surface Science*

Received Date: 28 August 2017  
Revised Date: 26 December 2017  
Accepted Date: 18 January 2018

Please cite this article as: D. Nam, Y. Heo, S. Cheong, Y. Ko, J. Cho, Amphiphilic Ligand Exchange Reaction-Induced Supercapacitor Electrodes with High Volumetric and Scalable Areal Capacitances, *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.01.153>

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 proof before it is published in its final 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.



# Amphiphilic Ligand Exchange Reaction-Induced Supercapacitor Electrodes with High Volumetric and Scalable Areal Capacitances

Donghyeon Nam, Yeongbeom Heo, Sanghyuk Cheong, Yongmin Ko<sup>\*</sup>, and Jinhan Cho<sup>\*</sup>

Department of Chemical & Biological Engineering, Korea University, 145 Anam-ro, Seongbuk-gu, Seoul, 02841, Republic of Korea.

<sup>\*</sup>Corresponding authors.

E-mail addresses: radiofeel@korea.ac.kr (Y. Ko), and jinhan71@korea.ac.kr (J. Cho)

## ABSTRACT

We introduce high-performance supercapacitor electrodes with ternary components prepared from consecutive amphiphilic ligand-exchange-based layer-by-layer (LbL) assembly among amine-functionalized multi-walled carbon nanotubes (NH<sub>2</sub>-MWCNTs) in alcohol, oleic acid-stabilized Fe<sub>3</sub>O<sub>4</sub> nanoparticles (OA-Fe<sub>3</sub>O<sub>4</sub> NPs) in toluene, and semiconducting polymers (PEDOT:PSS) in water. The periodic insertion of semiconducting polymers within the (OA-Fe<sub>3</sub>O<sub>4</sub> NP/NH<sub>2</sub>-MWCNT)<sub>n</sub> multilayer-coated indium tin oxide (ITO) electrode enhanced the volumetric and areal capacitances up to  $408 \pm 4 \text{ F cm}^{-3}$  and  $8.79 \pm 0.06 \text{ mF cm}^{-2}$  at  $5 \text{ mV s}^{-1}$ , respectively, allowing excellent cycling stability (98.8 % of the initial capacitance after 5000 cycles) and good rate capability. These values were higher than those of the OA-Fe<sub>3</sub>O<sub>4</sub> NP/NH<sub>2</sub>-MWCNT multilayered electrode without semiconducting polymer linkers (volumetric capacitance  $\sim 241 \pm 4 \text{ F cm}^{-3}$  and areal capacitance  $\sim 1.95 \pm 0.03 \text{ mF cm}^{-2}$ ) at the same scan rate. Furthermore, when the asymmetric supercapacitor cells (ASCs) were prepared using OA-Fe<sub>3</sub>O<sub>4</sub> NP- and OA-MnO NP-based ternary component electrodes, they displayed high volumetric energy ( $0.36 \text{ mW h cm}^{-3}$ ) and power densities ( $820 \text{ mW cm}^{-3}$ ).

Download English Version:

<https://daneshyari.com/en/article/7835431>

Download Persian Version:

<https://daneshyari.com/article/7835431>

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