## Accepted Manuscript

### Full Length Article

A novel ternary nanocomposite for improving the cycle life and capacitance of polypyrrole

Che-Wei Chu, Fitri Nur Indah Sari, Jack Chun-Ren Ke, Jyh-Ming Ting

| PII:       | \$0169-4332(18)32233-5                       |
|------------|--|
| DOI:       | https://doi.org/10.1016/j.apsusc.2018.08.096 |
| Reference: | APSUSC 40133                                 |

To appear in: Applied Surface Science

Received Date:26 March 2018Revised Date:30 July 2018Accepted Date:9 August 2018



Please cite this article as: C-W. Chu, F. Nur Indah Sari, J. Chun-Ren Ke, J-M. Ting, A novel ternary nanocomposite for improving the cycle life and capacitance of polypyrrole, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.08.096

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.

# ACCEPTED MANUSCRIPT

#### A novel ternary nanocomposite for improving the cycle life and capacitance of

#### polypyrrole

Che-Wei Chu<sup>1</sup>, Fitri Nur Indah Sari<sup>1</sup>, Jack Chun-Ren Ke<sup>3</sup>, Jyh-Ming Ting<sup>1,2\*</sup>

- 1. Department of Materials Science and Engineering
- 2. International Curriculum for Advanced Materials Program National Cheng Kung University, Tainan, Taiwan
  - 3. School of Physics and Astronomy

The University of Manchester, Manchester, UK

\* Email: jting@mail.ncku.edu.tw

## Abstract

A novel ternary nanocomposite MoS<sub>2</sub>/MoO<sub>3</sub>/polypyrrole (PPy) has been fabricated. MoO<sub>3</sub> nanoparticle-decorated few-layered MoS<sub>2</sub> nanosheets were first prepared via the exfoliation of partially oxidized MoS<sub>2</sub>. In situ oxidation polymerization was then used to fabricate the ternary nanocomposites. We show the synergetic effects provided by the ternary composites via investigating the electrochemical performance of supercapacitors using the nanocomposites as the electrodes. Furthermore, the morphology evolution during the synthesis of the MoO<sub>3</sub> nanoparticle-decorated MoS<sub>2</sub> nanosheets was also examined. This not only allows the understanding of the formation mechanism but also leads to the surprising discovery of unprecedented amorphous carbon (a-C) layers intercalated in between the MoS<sub>2</sub> nanosheets. We therefore propose a mechanism to explain the formation of such a-C layer and demonstrate that the a-C plays a critical role in the supercapacitor performance. Finally, we demonstrate that the cycle life and capacitance of PPy are enhanced via the addition of  $MoS_2/MoO_3$  with an excellent Csp of 352 Fg<sup>-1</sup> and electrochemical stability with Csp retention up to 105% after 2000 cycles.

Keywords: MoS<sub>2</sub>, MoO<sub>3</sub>, polypyrrole, amorphous carbon, supercapacitor

Download English Version:

# https://daneshyari.com/en/article/11006471

Download Persian Version:

https://daneshyari.com/article/11006471

Daneshyari.com