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## ***In Situ* Encapsulation of Tin Oxide and Cobalt Oxide Composite in Porous Carbon for High-Performance Energy Storage Applications**

Bhupender Pal<sup>a</sup>, Syam G. Krishnan<sup>a</sup>, Bincy Lathakumary Vijayan<sup>a</sup>, Midhun Harilal<sup>a</sup>, Chun-Chen Yang<sup>b</sup>, Fabian I. Ezema,<sup>c</sup> Mashitah Mohd. Yusoff<sup>a</sup>, Rajan Jose<sup>a\*</sup>

<sup>a</sup>Nanostructured Renewable Energy Materials Laboratory, Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang

<sup>b</sup>Battery Research Centre of Green Energy, Ming Chi University of Technology, New Taipei, Taiwan.

<sup>c</sup>Department of Physics and Astronomy, University of Nigeria, Nsukka, Nigeria

\*Corresponding Author: rjose@ump.edu.my

### **Abstract**

Herein, we report the preparation of porous carbon from palm kernel shell and loading of tin oxide-cobalt oxide in its pores using a facile *in-situ* encapsulation synthesis strategy. The as-synthesized SnO<sub>2</sub>/Co<sub>3</sub>O<sub>4</sub>@C composite was characterized by powder X-ray diffraction, X-ray photoelectron spectroscopy and field-emission scanning electron microscopy techniques. Electrochemical charge storage capabilities of the composite were measured using cyclic voltammetry, charge-discharge cycling and electrochemical impedance spectroscopy in aqueous 6 M KOH and 1 M Na<sub>2</sub>SO<sub>4</sub> electrolytes. The SnO<sub>2</sub>/Co<sub>3</sub>O<sub>4</sub>@C composite showed over 70% higher specific capacitance (177 F g<sup>-1</sup>) than the pure porous carbon (106 F g<sup>-1</sup>) in 6M KOH. Among these electrolytes, the composite exhibited an enhanced electrochemical performance in KOH electrolyte due to its smaller hydrated ion radius, high ionic mobility and lower equivalent series resistance than Na<sub>2</sub>SO<sub>4</sub>.

**Key words:** Porous carbon, composite, electrolytes, specific capacitance, energy and power density.

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