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Materials Today: Proceedings 16 (2019) 2273–2279

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Bio-CAM 2017

Highly stable symmetric supercapacitor from cysteamine functionalized multi-walled carbon nanotubes operating in a wide potential window

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Abstract

In this paper, the functionalized multi-walled carbon nanotubes with thiol group (MWCNTs-SH) were used to fabricate a symmetric supercapacitor. The symmetric supercapacitor shows a superior electrochemical performance under a wide range of operating voltage up to 2 V and gives a specific capacitance of 85.3 F g^{-1} at 0.25 A g^{-1} (2 V) in 1 M Na_2SO_4. In addition, the supercapacitor shows high energy density of 11.9 Wh kg^{-1}. The findings reveal that this functionalized material is a good candidate for supercapacitor electrode materials.

Selection and/or Peer-review under responsibility of Biomedical and Advanced Materials (Biocam 2017).

Keywords: Cysteamine; EDLC; Functionalization; MWCNTs; Supercapacitors.

1. Introduction

Carbon nanotubes (CNTs) is a promising material as it has high length-to-diameter and surface area–to–volume aspect ratios [1]. It also possesses superior mechanical, thermal, electrical, chemical and thermal properties as well as it has unique internal structures and low mass density [2]. Hence, CNTs have received considerable attention for usage in chemistry and environmental remediation. CNTs could be prepared via different chemical and mechanical method such as; arc–discharge [3], laser vaporization [4], chemical vapor deposition [5], spray–pyrolysis [6], flame

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