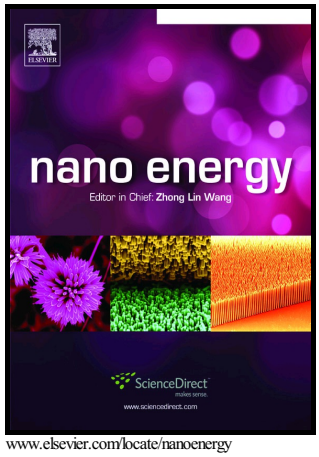
Author's Accepted Manuscript



www.elsevier.com/locate/nanoenergy

Flexible Self-Charging Supercapacitor Based on Graphene-Ag-3D Graphene Foam Electrodes

Libu Manjakkal, Carlos García Núñez, Wenting Dang, Ravinder Dahiya

PII: S2211-2855(18)30466-X
DOI: https://doi.org/10.1016/j.nanoen.2018.06.072
Reference: NANOEN2853

To appear in: *Nano Energy*

Received date: 10 March 2018
Revised date: 14 June 2018
Accepted date: 20 June 2018

Cite this article as: Libu Manjakkal, Carlos García Núñez, Wenting Dang and Ravinder Dahiya, Flexible Self-Charging Supercapacitor Based on Graphene-Ag-3D Graphene Foam Electrodes, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.06.072

Flexible Self-Charging Supercapacitor Based on Graphene-Ag-3D Graphene Foam Electrodes

Libu Manjakkal, Carlos García Núñez, Wenting Dang, Ravinder Dahiya*

Bendable Electronics and Sensing Technologies (BEST) Group, School of Engineering, University of Glasgow, G12 8QQ, U.K.

*Corresponding author. Ravinder.Dahiya@glasgow.ac.uk

Abstract

A flexible three-dimensional porous graphene foam-based supercapacitor (GFSC) is presented here for energy storage applications. With a novel layered structure of highly conductive electrodes (graphene-Ag conductive epoxy–graphene foam), forming an electrochemical double layer, the GFSC exhibits excellent electrochemical and supercapacitive performance. At a current density of 0.67 mA cm^{-2}, the GFSCs show excellent performance with areal capacitance (38 mF cm^{-2}) about three times higher than the values reported for flexible carbon-based SCs. The observed energy and power densities (3.4 μW h cm^{-2} and 0.27 mW cm^{-2} respectively) are better than the values reported for carbon-based SCs. Analyzed under static and dynamic bending conditions, the GFSCs are stable with up to 68% capacitance retention after 25000 charge–discharge cycles. The light-weight, cost-effective fabrication and no self-heating make the GFSCs a promising alternative to conventional source of energy in the broad power density ranging from few nW cm^{-2} to mW cm^{-2}. In this regard, GFSC was integrated with a flexible photovoltaic cell resulting in a