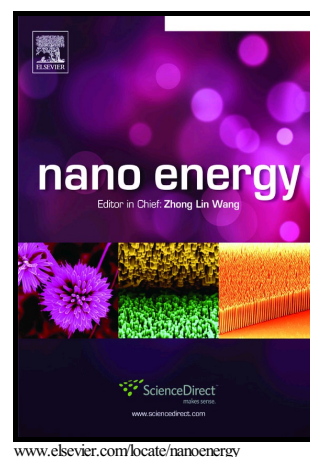


Author's Accepted Manuscript

Full Lithographic Fabrication of Boron-doped 3D Porous Carbon Patterns for High Volumetric Energy Density Microsupercapacitors

Cheolho Kim, Dayoung Kang, Jun Hyuk Moon



PII: S2211-2855(18)30608-6
DOI: <https://doi.org/10.1016/j.nanoen.2018.08.044>
Reference: NANOEN2974

To appear in: *Nano Energy*

Received date: 24 April 2018
Revised date: 7 August 2018
Accepted date: 20 August 2018

Cite this article as: Cheolho Kim, Dayoung Kang and Jun Hyuk Moon, Full Lithographic Fabrication of Boron-doped 3D Porous Carbon Patterns for High Volumetric Energy Density Microsupercapacitors, *Nano Energy*, <https://doi.org/10.1016/j.nanoen.2018.08.044>

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 galley proof before it is published in its final citable 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.

Full Lithographic Fabrication of Boron-doped 3D Porous Carbon Patterns for High Volumetric Energy Density Microsupercapacitors

*Cheolho Kim, Dayoung Kang and Jun Hyuk Moon**

Department of Chemical and Biomolecular Engineering, Sogang University, Baekbeom-ro 35, Mapo-gu, Seoul, 04107, Republic of Korea

*Corresponding author: E-mail: junhyuk@sogang.ac.kr

Abstract:

Carbon electrodes that are thick and maintain a high volumetric energy density are essential for high energy storage microsupercapacitors (MSCs). Here, fabrication of an electrode based on a boron-doped 3D porous carbon pattern (B-3D-PCP) by lithographic processes is demonstrated. The B-3D-PCP is obtained by carbonization and doping of a polymer pattern fabricated by interference lithography. Then, plasma etching is performed on the B-3D-PCP to obtain an interdigitated electrode, and a polymer electrolyte is applied to complete the MSC. The B-3D-PCP shows remarkably high pseudocapacitance after B-doping. This electrode also exhibits no capacitance loss when the electrode width increases, even at very high scan rates, owing to the uniform pores of the 3D-PCP. The solid-state B-3D-PCP MSC with a polymer gel electrolyte shows a capacitance of 7.15 mF/cm^2 , with a remarkable capacitance retention of 81%, especially upon a scan rate increase of 10 times at 100 mV. With B-3D-PCP MSCs, a volumetric energy density of 7.1 mWh/cm^3 and a volumetric power density of 66 W/cm^3 could be achieved. Finally, the performance of the MSC is demonstrated

Download English Version:

<https://daneshyari.com/en/article/10135851>

Download Persian Version:

<https://daneshyari.com/article/10135851>

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