

Accepted Manuscript

Title: Modulating structural hierarchies of manganese oxide in morphology and porosity by marine biopolymer for improved supercapacitors

Author: Lu Zong Xiaochen Wu Jun You Mingjie Li Chaoxu Li



PII: S0013-4686(16)31690-5
DOI: <http://dx.doi.org/doi:10.1016/j.electacta.2016.07.158>
Reference: EA 27773

To appear in: *Electrochimica Acta*

Received date: 26-6-2016
Revised date: 27-7-2016
Accepted date: 30-7-2016

Please cite this article as: Lu Zong, Xiaochen Wu, Jun You, Mingjie Li, Chaoxu Li, Modulating structural hierarchies of manganese oxide in morphology and porosity by marine biopolymer for improved supercapacitors, *Electrochimica Acta* <http://dx.doi.org/10.1016/j.electacta.2016.07.158>

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.

<AT>Modulating structural hierarchies of manganese oxide in morphology and porosity by marine biopolymer for improved supercapacitors

<AU>Lu Zong^{a,b}, Xiaochen Wu^a, Jun You^a, Mingjie Li^{a*} ##Email##limj@qibebt.ac.cn##/Email##, Chaoxu Li^{a,b*} ##Email##licx@qibebt.ac.cn##/Email##

<AU>

<AFF>^aCAS Key Laboratory of Bio-based materials, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences, Songling Road 189, Qingdao 266101, PR China

<AFF>^bUniversity of Chinese Academy of Sciences, 19A Yuquan Road, Beijing 100049, China

<ABS-HEAD>Abstract

<ABS-P>Nanostructured MnO₂ is one of the most promising electrode materials for supercapacitors (SCs) on account of its exceptional properties including high theoretical capacitance, natural abundance, environmental safety and low cost. However its merits cannot be fully embodied by its current synthesis approaches, since most of them were normally tedious, costly, low yield or environment unfriendly, and poor in controlling multiple parameters of MnO₂. Inspired by biopolymer-assisted synthesis of hierarchical inorganic materials in living systems, a marine biopolymer was used for structurally-controllable synthesis of MnO₂ in this study. Functioning as the reductant, surfactant and directing agent, alginate could tune the hierarchical architecture of MnO₂ in multiple parameters including the dimension, nanometric size, crystallographic form and porosity, where δ -MnO₂ nanocrystals with the size of 5~10 nm first assembled into nanosheets, and then flower-like structure with particle size tunable within 40~200 nm as well as micro- and mesopores. Due to these unique hierarchies in both the morphology and porosity, as-prepared MnO₂ exhibited excellent performance as SC electrode, e.g. high power density (32.5 kW kg⁻¹), high energy density (75.1 Wh kg⁻¹) and great cycling stability. Given the green, low-temperature and scalable one-step process, this synthesis may pave a highly promising way to massive production of MnO₂ electrode materials for SCs.

<KWD>Keywords: hierarchical nanostructure; manganese oxide; marine biopolymer; supercapacitors

Download English Version:

<https://daneshyari.com/en/article/6605952>

Download Persian Version:

<https://daneshyari.com/article/6605952>

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