Accepted Manuscript

Amorphous Hierarchical Porous Manganese Oxides for Supercapacitors with Excellent Cycle Performance and Rate Capability

Ma Qian, Yang Min, Xia Xiaohong, Chen Hui, Yang Li, Liu Hongbo

PII: S0013-4686(18)31936-4

DOI: 10.1016/j.electacta.2018.08.151

Reference: EA 32702

To appear in: Electrochimica Acta

Received Date: 04 May 2018

Accepted Date: 29 August 2018

Please cite this article as: Ma Qian, Yang Min, Xia Xiaohong, Chen Hui, Yang Li, Liu Hongbo, Amorphous Hierarchical Porous Manganese Oxides for Supercapacitors with Excellent Cycle Performance and Rate Capability, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.08.151

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.



1 Amorphous Hierarchical Porous Manganese Oxides for Supercapacitors with

2 Excellent Cycle Performance and Rate Capability

- 3 Ma Qian^a, Yang Min^a, Xia Xiaohong^{a,b*}, Chen Hui^a, Yang Li^a, Liu Hongbo^{a,b*}
- 4 ^a College of Material Science and Engineering, Hunan University, Changsha, Hunan 410082, China
- 5 ^b Hunan province key laboratory for advanced carbon materials and applied technology, Hunan University
- *Corresponding author College of Material Science and Engineering, Hunan University, Changsha, Hunan 410082,
 China.
- 8 Tel.: +86-18684656260, +86-13974817841; Fax: +86-731-8823564.
- 9 E-mail addresses: <u>xxh@hnu.edu.cn</u> (Xia X.); <u>hndxlhb@163.com</u> (Liu H.)

10 Abstract

- 11 Manganese oxides are considered as great pseudo-capacitance materials due to their high theoretical capacitance,
- 12 but they usually suffer from unstable cycle performance and poor rate capability. To explore whether above problems
- 13 are associated with crystallinity, electrochemical performances of amorphous and crystalline manganese dioxide are
- 14 thoroughly investigated. Especially, ex-situ XPS and ICP-OES measurements are carried out to examine whether the
- 15 amount of intercalated Na⁺ ions is determined by crystallinity and has influence on cycle performance and rate
- 16 capability. Meanwhile, relationship between pore size distribution and electrochemical performance of manganese
- 17 dioxides is discussed. We find that the amorphous manganese dioxide with hierarchical pores presents the best
- 18 performance in this work, which exhibits a specific capacitance of 405.2 F g^{-1} at a scan rate of 1 mV s^{-1} and 391.9 F
- 19 g^{-1} at a current density of 0.1 A g^{-1} in a three-electrode system. Moreover, the amorphous-phase nanoparticle
- 20 electrode possesses an excellent cycle life with 95.1% retention of its initial capacitance after 5200 cycles and a good
- rate capability of 75.3% retention at 10 mV s⁻¹, which are superior to that of the crystalline one in this work and lots
- 22 of reported crystalline MnO_2 nano-materials.
- *Keywords*: Amorphous manganese dioxide; hierarchical porous structure; cycle performance; rate capability;
 supercapacitor electrode.

25 **1. Introduction**

Download English Version:

https://daneshyari.com/en/article/10225167

Download Persian Version:

https://daneshyari.com/article/10225167

Daneshyari.com