Int. J. Electrochem. Sci., 13 **(2018)** 2934 – 2944

International Journal of
ELECTROCHEMICAL
SCIENCE
www.electrochemsci.org

Low-Cost and High-Performance Electrospun Carbon Nanofiber Film Anodes

Jianxin Cai[1], *Wei Li*[1], *Pengfei Zhao*[1], *Ji Yu*[2], *Zhenyu Yang*[2,*]

[1] School of Resources Environmental and Chemical Engineering, Nanchang University, No. 999 Xuefu Road, Nanchang, Jiangxi,330031, P. R. China
[2] School of Chemistry, Nanchang University, No.999 Xuefu Road, Nanchang, Jiangxi, 330031, P. R. China
[*]E-mail: cjx@ncu.edu.cn

doi: 10.20964/2018.03.43

Received: 21 November 2017 / *Accepted:* 10 January 2018 / *Published:* 5 February 2018

Carbon nanofiber thin membrane is a promising candidate material for chemical power supply because of its simple design and fast charge-transfer network. In this study, the original porous carbon nanofiber thin membrane electrode was electrospun following a simple and rapid washing process. The structural features of the porous carbon nanofiber membranes were characterized by scanning electron microscopy, transmission electron microscopy, X-ray diffraction, and Brunauer–Emmett–Teller analysis. The electrochemical performance of the porous carbon nanofiber membranes was investigated by electrochemical test. Results show that the as-prepared porous carbon nanofiber film possesses a highly porous surface structure and demonstrates an outstanding electrochemical performance. The film electrode exhibits a charge capacity of 948.1 $mAh \cdot g^{-1}$ under a C-rate of 0.1C (37.2 $mA \cdot g^{-1}$) and 208.8 $mAh \cdot g^{-1}$ after 1700 cycles under a C-rate of 5C (1860 $mA \cdot g^{-1}$). In the preparation of a binder- and conductive-free thin film electrode, the addition of NaCl increases the precursor viscosity, which results in a slimmer fiber and significantly improves the specific surface area by washing NaCl crystals with water. This method avoids rinsing with an acidic or basic solution and recycles the used NaCl, thereby significantly reducing the preparation cost of porous carbon fiber thin film electrode. This work demonstrates a new method of preparing high-value porous carbon fiber thin film electrodes at a low cost.

Keywords: Electrospinning, Low-Cost, Sodium chloride, Porous carbon nanofiber film, Lithium ion batteries

FULL TEXT