Microporous Carbon Materials from Bacterial Cellulose for Lithium–Sulfur Battery Applications

Yatong Quan¹, Dongmei Han², Yuhong Feng^{1,*}, Shuanjin Wang², Min Xiao², and Yuezhong Meng^{2,*}

¹ College of Materials and Chemical Engineering, Hainan University, 58 Ren Min Road, Hainan, Haikou 570228, China

² The Key Laboratory of Low-carbon Chemistry & Energy Conservation of Guangdong Province/State Key Laboratory of Optoelectronic Materials and Technologies, School of Materials Science and Engineering, Sun Yat-sen University, Guangzhou 510275, P. R. China

*E-mail: hn136.631@163.com, mengyzh@mail.sysu.edu.cn

doi: 10.20964/2017.07.17

Received: 21 March 2017 / Accepted: 28 April 2017 / Published: 12 June 2017

The biomass-derived porous carbon materials is one of the most promising sulfur host materials for Li-S batteries applications. This work reports the preparation and application of a novel nitrogen-doped nanostructured microporous carbon materials (NMC) from sustainable bacterial cellulose (BC) subjecting to activation with KOH. The new material has a considerable specific surface area ($1479 \text{ m}^2 \text{ g}^{-1}$) and high pore volume (1.14 g cm^{-3}), therefore it exhibits excellent electrical conductivity. The sulfur–NMC (S@NMC) composites based on NMC was synthesized via melt-diffusion method and used as the cathode material in Li-S batteries. The obtained S@NMC composite containing 68.3 wt% sulfur showed the highest rate capability and long cycling stability. The experiment results also show a high initial discharge capacity of 1267 mAh g^{-1} and capacity retention of 995 mAh g^{-1} after 500 discharge/charge cycles at a rate of 0.1C with a coulombic efficiency of 99.0 %.

Keywords: Bacterial Cellulose; Microporous carbon materials; Nitrogen-doped; Lithium-sulfur battery

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).