In-situ Grown Hierarchical MoS₂ Nanoflakes on Three-Dimensional Carbon Fiber Papers as Free-Standing Anodes for Lithium-Ion Battery

Hongjie Li^{1,2}, Yi He^{1,2,*}, Qiangbing Yang³, Jizhuang Wang^{1,2}, Siming Yan^{1,2} and Jingyu Chen^{4,*}

¹ State Key Lab of Oil and Gas Reservoir Geology and Exploitation (Southwest Petroleum University), Chengdu, 610500, China.

² College of Chemistry and Chemical Engineering, Southwest Petroleum University, Chengdu, 610500, China

³ Chongqing Key Laboratory of Environmental Materials & Remediation Technologies, Chongqing University of Arts and Sciences, Chongqing 402160, China.

⁴ Deakin University, Institute for Frontier Materials, VIC 3220, Australia.

*E-mail: chemheji@swpu.edu.cn; jingyu.chen@deakin.edu.au

doi: 10.20964/2019.09.31

Received: 17 April 2019 / Accepted: 28 June 2019 / Published: 31 July 2019

Owing to the high capacity of MoS₂, it's considered to be a next-generation lithium ion batteries (LIB) anode material. However, the weak electron transfer limits its application. Herein, hierarchical MoS₂@CFP composite materials based on in-situ grown hierarchical MoS₂ nanoflakes on three-dimensional carbon fiber paper (CFP) is prepared. The hierarchical MoS₂/CFP composites serve as self-supporting electrodes and show potential for improved battery performance. The 1st discharge capacity reached 1332 mAh/g and still reached 703 mAh/g after 100 cycles at a current density of 0.1 A/g. The superior performance of the MoS₂@CFP composites was mainly attributed to the combination of a high capacity ability of MoS₂ and the high electron transport capability of carbon fibers. In addition, this synthetic strategy provides a certain idea for the synthesis of other layered composite materials.

Keywords: MoS₂ nanoflakes, carbon fiber papers, lithium-ion battery, in-situ growth

[FULL TEXT](#)

© 2019 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/>).