Structural and Electrochemical Investigation of Zinc-Doped Lithiated MoO₃ Cathode Materials for Lithium-Ion Batteries

Jianyong Wang^{1,2}, Jiayuan Shi^{2,*}, Bin Shi², Yunhuai Zhang^{1,*}

¹ College of Chemistry and Chemical Engineering, Chongqing University, Chongqing 400044, China

² State Key Laboratory of Advanced Chemical Power Sources (SKL-ACPS), Guizhou Meiling Power Sources Co., Ltd., Guizhou, 563003, P. R. China

*E-mail: jiayshi@163.com (J. Shi), zyh2031@cqu.edu.cn (Y. Zhang)

doi: 10.20964/2020.10.04

Received: 8 June 2020 / Accepted: 24 July 2020 / Published: 31 August 2020

In this study, the microplates of zinc-doped lithiated MoO₃ cathode materials have been successfully prepared through a facile one-pot method. The XRD, XPS and the ICP results show that the zinc-doping of MoO₃ favors Li_{0.042}MoO₃ phase formation in the crystal lattice of the product, which can result in the improvement of the electrical conductivity of the MoO₃ cathode. By comparing with the SEM images of the pristine MoO₃ material, the SEM images show that the zinc-doping and lithiation can reduce the size and thickness of MoO₃ particles. When the zinc-doped lithiated MoO₃ (ZLMO-2) is used as a cathode material for lithium-ion batteries, it delivers an initial discharge capacity of 341.7 mAh·g⁻¹ at a current density of 30 mA·g⁻¹. Moreover, ZLMO-2 shows a cyclic stability (capacity retention of 57.9% after 100 cycles) and rate capability that are better than those of pristine MoO₃. This can be attributed to the increased conductivity and ion diffusivity achieved by MoO₃ lithiation and the enhanced electrochemical stability achieved by the pillar effect of zinc doping.

Keywords: MoO₃, zinc-doping, lithiation, lithium-ion batteries, cathode material

[FULL TEXT](#)

© 2020 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/>).