Hierarchical MoS_2 anchored on core-shell Si@C with increased active-sites and charge transfer for superior cycling and rate capability in lithium-ion batteries

Xinlin Zhang, Liwu Huang, Pan Zeng, Lin Wu, Qianqian Shen, Zhixi Gao, Yungui Chen

PII: S1385-8947(18)31883-7
DOI: https://doi.org/10.1016/j.cej.2018.09.163
Reference: CEJ 20002

To appear in: *Chemical Engineering Journal*

Received Date: 13 June 2018
Revised Date: 1 August 2018
Accepted Date: 21 September 2018

Please cite this article as: X. Zhang, L. Huang, P. Zeng, L. Wu, Q. Shen, Z. Gao, Y. Chen, Hierarchical MoS_2 anchored on core-shell Si@C with increased active-sites and charge transfer for superior cycling and rate capability in lithium-ion batteries, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.09.163

Hierarchical MoS_2 anchored on core-shell Si@C with increased active-sites and charge transfer for superior cycling and rate capability in lithium-ion batteries

Xinlin Zhang, Liwu Huang*, Pan Zeng, Lin Wu, Qianqian Shen, Zhixi Gao and Yungui Chen*

College of Materials Science and Engineering, Sichuan University, Chengdu 610065, PR China

Abstract: Size-controlling and in situ hybridization of two or more active materials have been considered as promising strategies to accommodate the volume variation and enhance the conductivity of silicon, resulting in excellent electrochemical performance in lithium-ion batteries (LIBs). Herein, sandwich-like Si@C@MoS_2 composite containing core-shell Si@C with interconnected MoS_2 nanosheets decorated on was fabricated by molten salt magnesiothermic reduction, resorcinol formaldehyde (RF) coating and hydrothermal process. Moreover, to optimize the electrochemical properties, Si@C@MoS_2 composite with different contents of MoS_2 were also studied. Especially, Si@C@MoS_2-0.1 composite exhibits a reversible capacity of 1365.7 mAh g^{-1} at 0.5 A g^{-1} after 500 cycles, accompanying by a high initial coulombic efficiency of 81.5 %, and superior rate capability of ~ 872.4 mAh g^{-1} at 10.0 A g^{-1}. Moreover, the full cell that assembled by the pretreated Si@C@MoS_2-0.1 electrode as anode and commercial $LiCoO_2$ as cathode also delivers

* **Corresponding author.**

***E-mail*: ygchen60@aliyun.com (Yungui Chen), liwuhuang@scu.edu.cn (Liwu Huang).**