Graphene/Carbon Nanotubes Composite as a Polysulfide Trap for Lithium-Sulfur Batteries

Feng Gao^{1,2}, Xinxiu Yan^{1,2}, Zhikai Wei¹, Meizhen Qu¹, Weifeng Fan^{1,*}

¹ Chengdu Institute of Organic Chemistry, Chinese Academy of Sciences, Chengdu 610041, P.R. China.

² University of Chinese Academy of Sciences, Beijing 100049, P.R. China.

*E-mail: fanwf@cioc.ac.cn

doi: 10.20964/2019.04.16

Received: 12 December 2018 / Accepted: 17 January 2019 / Published: 10 March 2019

Separator modified with graphene/carbon nanotube composite (G/CNT) is introduced into lithium-sulfur (Li-S) battery to trap and activate the soluble polysulfides. The Li-S battery based on a novel separator allows sulfur cathode to reach a high initial discharge capacity of 1200 mAh.g⁻¹ at 0.2 C and a reversible capacity of 815 mAh.g⁻¹ after 100 cycles at 0.5 C, which led to an excellent rate capability (up to 2 C rate) and a high Coulombic efficiency of 99%. In this study, the role of separator modified with G/CNT in the electrochemistry of Li-S batteries was also systematically explored. The electrical conductivity and the special leaf stack structure of G/CNT layer have a synergistic effect in controlling the shuttle effect of polysulfides. Moreover, the G/CNT layer can compensate for the effects of deterioration of the morphology of sulfur cathode.

Keywords: Lithium-sulfur battery; Carbon nanotube; Graphene; Modified separator; Shuttle effect

[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/>).