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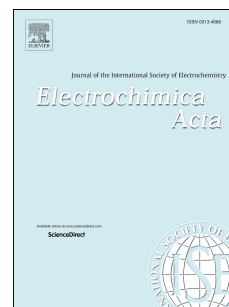
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Multi-functional CoS₂-N-C Porous Carbon Composite Derived from Metal-Organic Frameworks for High Performance Lithium-Sulfur Batteries

Shiqiang Luo¹, Chunman Zheng^{1,*}, Weiwei Sun, Yiqi Wang, Jianhuang Ke,

QingPeng Guo, Shuangke Liu, Xiaobin Hong, Yujie Li, Wei Xie^{*}

*(College of Aerospace Science and Engineering, National University of Defense
Technology, Hunan Changsha 410073, China)*

Abstract

Lithium-sulfur (Li-S) battery is recognized as one of the most promising high-energy-density storage system. However, the poor cycle life and low sulfur utilization originating from the shuttling process involving lithium polysulfide (LiPSs) significantly hinder the practical application of Li-S battery. Various approaches have been introduced to retard the shuttle of LiPSs. Herein, a polar cobalt disulfide embedded in porous nitrogen doped carbon frameworks (CoS₂-N-C) is synthesized from a single metal-organic framework ZIF-67. When used as a sulfur host for Li-S battery cathode, the CoS₂-N-C frameworks can not only limit the dissolution of LiPSs by chemisorption, but also buffer the volume expansion during cycling. More importantly, the electrochemical reaction kinetics is greatly improved. As a result, the Li-S battery based on the S/CoS₂-N-C electrode exhibits a high initial discharge capacity of 1288 mAh g⁻¹ at 0.2 C and a superior long cycle life for 500 cycles with a

¹ These authors contributed equally to this work and should be considered co-first authors

* Corresponding author 1. Tel.: +8613975146446. E-mail address: zhengchunman@nudt.edu.cn

* Corresponding author 2. Tel.: +8618569548702. E-mail address: xiew014@mail.ustc.edu.cn

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