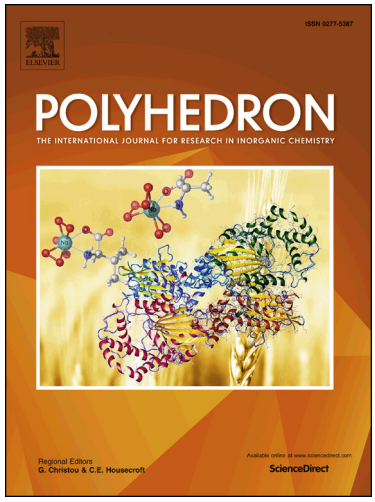

Review

Recent Progress in Metal–Organic Frameworks for Lithium–Sulfur Batteries

Yijun Zhong, Xiaomin Xu, Yu Liu, Wei Wang, Zongping Shao

PII: S0277-5387(18)30535-7
DOI: https://doi.org/10.1016/j.poly.2018.08.067
Reference: POLY 13390

To appear in: *Polyhedron*

Received Date: 28 May 2018
Accepted Date: 23 August 2018

Please cite this article as: Y. Zhong, X. Xu, Y. Liu, W. Wang, Z. Shao, Recent Progress in Metal–Organic Frameworks for Lithium–Sulfur Batteries, *Polyhedron* (2018), doi: https://doi.org/10.1016/j.poly.2018.08.067

Review

Recent Progress in Metal–Organic Frameworks for Lithium–Sulfur Batteries

Yijun Zhong[a], Xiaomin Xu[a], Yu Liu[a], Wei Wang[a] and Zongping Shao[a,b,*]

[a] WA School of Mines: Minerals, Energy and Chemical Engineering (WASM-MECE), Curtin University, Perth, WA 6845, Australia.
[b] Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM), State Key, Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, Nanjing Tech University, No. 5 Xin Mofan Road, Nanjing 210009, P.R. China.
* E-mail address: zongping.shao@curtin.edu.au (Z. Shao)

Keywords: Lithium–sulfur battery, Metal–organic framework, Coordination polymer, Polysulfide, Lewis acid−base interaction

Abstract

The development of novel electrochemical energy storage systems has induced a great evolution of sustainable production and life. Lithium–sulfur (Li–S) batteries show a significant potential of becoming the next-generation energy storage systems, even though several vital problems, especially the dissolution and loss of active polysulfides, still hinder their practical application. Metal–organic frameworks (MOFs), a novel class of porous crystalline materials, and their derived materials, exhibit great potential for anchoring soluble polysulfides due to the unique physical and surface chemical property. In this review, we dedicate to review strategies for designing MOF-based and MOF-derived materials as hosts and functional polysulfide barriers for Li–S batteries. By revisiting three most important parameters for the design of hosts, namely conductivity, porosity and chemisorption to polysulfides, we hope to gain a greater understanding of how these MOF-related materials promote the electrochemical performance and the cycle stability of Li–S batteries. We also summarize the recent advances of two types of polysulfide barriers working based on an adsorbing-reutilization approach and a blocking approach. Finally, we point out the main challenges and some perspectives for the future development of this promising area.