Accepted Manuscript

Facile synthesis of three dimensional porous cellular carbon as sulfur host for enhanced performance lithium sulfur batteries

Yiqi Wang, Shiqiang Luo, Danqian Wang, Xiaobin Hong, Shuangke Liu

PII: S0013-4686(18)31655-4

DOI: 10.1016/j.electacta.2018.07.141

Reference: EA 32338

To appear in: *Electrochimica Acta*

Received Date: 22 April 2018

Revised Date: 1 July 2018

Accepted Date: 19 July 2018

Please cite this article as: Y. Wang, S. Luo, D. Wang, X. Hong, S. Liu, Facile synthesis of three dimensional porous cellular carbon as sulfur host for enhanced performance lithium sulfur batteries, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.07.141.

Facile synthesis of three dimensional porous cellular carbon as sulfur host for enhanced performance lithium sulfur batteries

Yiqi Wang, Shiqiang Luo, Danqian Wang, Xiaobin Hong*, Shuangke Liu*

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

Abstract: Lithium sulfur battery has drawn intense interests due to its high theoretical specific capacity and high energy density. However, it remains a big challenge to achieve high capacities and sulfur loadings of cathode via a facile and scaled-up method for the practical applications of lithium sulfur batteries. Herein we designed a three dimensional porous cellular carbon framework (PCCF) as sulfur host via a simple template-activation method. The honeycomb architecture of the PCCF with high BET surface area could encapsulate high content sulfur and the 3D interconnected carbon framework could realize high sulfur loading electrode. Benefiting from the 3D porous cellular architecture, the obtained cellular PCCF/S cathode delivers a notable enhancement in the sulfur content, sulfur loading, cycling stability and rate performance. The PCCF/S cathode with high sulfur content of 84.75% exhibits an initial discharge capacity of 1264.4 mAh g^{-1} at 0.1C rate and shows good cycling stability with a low capacity decay rate of 0.14% per cycle after 200 cycles at 1C rate. With a high sulfur loading of 6.40 mg cm^{-2}, the cell delivers an initial discharge capacity of 1162.3 mAh g^{-1} and maintains good cycling stability.

Keywords: lithium sulfur batteries, porous cellular carbon, high sulfur loading, template-activation method