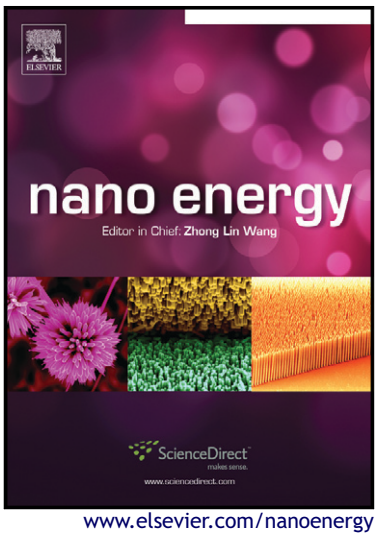

www.elsevier.com/nanoenergy

Sulfur cathode based on layered carbon matrix for High-performance Li-S batteries

Feng Wu, Ji Qian, Renjie Chen, Teng Zhao, Rui Xu, Yusheng Ye, Wenhui Li, Li Li, Jun Lu, Khalil Amine

PII: S2211-2855(15)00032-4
DOI: http://dx.doi.org/10.1016/j.nanoen.2014.12.042
Reference: NANOEN691

To appear in: *Nano Energy*

Received date: 2 December 2014
Accepted date: 14 December 2014

Cite this article as: Feng Wu, Ji Qian, Renjie Chen, Teng Zhao, Rui Xu, Yusheng Ye, Wenhui Li, Li Li, Jun Lu, Khalil Amine, Sulfur cathode based on layered carbon matrix for High-performance Li-S batteries, *Nano Energy,* http://dx.doi.org/10.1016/j.nanoen.2014.12.042

Sulfur cathode based on layered carbon matrix for high-performance Li-S batteries

Feng Wu[a,b], Ji Qian[a], Renjie Chen[a,b,*], Teng Zhao[a,1], Rui Xu[c], Yusheng Ye[a], Wenhui Li[a], Li Li[a,b], Jun Lu[c,*], Khalil Amine[c*]

[a]Beijing Key Laboratory of Environmental Science and Engineering, School of Chemical Engineering and Environment, Beijing Institute of Technology, Beijing 100081, PR China

[b]National Development Center of High Technology Green Materials, Beijing 100081, PR China

[c]Chemical Sciences and Engineering Division, Argonne National Laboratory, 9700 South Cass Avenue, Lemont, IL 60439, USA

*Corresponding Author. E-mail address: chenrj@bit.edu.cn (R. J. Chen); junlu@anl.gov (J. Lu); and amine@anl.gov (K. Amine)

[1]Teng Zhao now is a Ph. D. candidate at University of Cambridge, UK

Abstract

A novel carbon/sulfur composite has been fabricated by means of thermal and hydro-thermal treatments to serve as the cathode in Li-S batteries. The carbon matrix consists of graphene nanosheet (GS) and multiwalled carbon nanotube (MWCNT). The "GS/MWCNT@S" composite allows for infiltration of electrolyte into the cathode, assists in entrapment of polysulfide intermediates, and accommodates some of the stress and volume expansion that occurs during charge-discharge processes. In addition, the uniform distribution of sulfur in the conductive carbon matrix promotes utilization of the active materials. A Li-S cell containing the GS/MWCNT@S cathode delivered a capacity of 1290.8 mAh/g and exhibited stable specific capacities up to 612.1 mAh/g after 200 cycles at 0.1C. These results demonstrate that this