

Accepted Manuscript

Title: Effects of Angular Fillers on Thermal Runaway of Lithium-Ion Battery

Author: Meng Wang, Anh V. Le, Yang Shi, Daniel J. Noelle, Hyojung Yoon, Minghao Zhang, Y. Shirley Meng, Yu Qiao

PII: S1005-0302(16)30183-9

DOI: <http://dx.doi.org/doi: 10.1016/j.jmst.2016.10.001>

Reference: JMST 816

To appear in: *Journal of Materials Science & Technology*

Received date: 9-11-2015

Revised date: 2-1-2016

Accepted date: 2-3-2016

Please cite this article as: Meng Wang, Anh V. Le, Yang Shi, Daniel J. Noelle, Hyojung Yoon, Minghao Zhang, Y. Shirley Meng, Yu Qiao, Effects of Angular Fillers on Thermal Runaway of Lithium-Ion Battery, *Journal of Materials Science & Technology* (2016), <http://dx.doi.org/doi: 10.1016/j.jmst.2016.10.001>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Effects of Angular Fillers on Thermal Runaway of Lithium-Ion Battery

Meng Wang¹, Anh V. Le¹, Yang Shi², Daniel J. Noelle², Hyojung Yoon³, Minghao Zhang³, Y. Shirley Meng³, Yu Qiao^{1, 2,*}

¹ *Department of Structural Engineering, University of California - San Diego, La Jolla, CA 92093-0085, USA*

² *Program of Materials Science and Engineering, University of California - San Diego, La Jolla, CA 92093, USA.*

³ *Department of Nanoengineering, University of California – San Diego, La Jolla, CA 92093, USA*

* Corresponding author. Tel.: +1 858 534 3388.

E-mail address: yqiao@ucsd.edu (Yu Qiao).

[Received 9 November 2015; Received in revised form 2 January 2016; Accepted 2 March 2016]

By adding 1 wt% damage homogenizer (DH), i.e. carbon black microparticles, into the electrodes of lithium-ion batteries, thermal runaway can be mitigated as the battery cells are subjected to impact loadings. In a drop tower test, the generated heat of the modified cells is reduced by nearly 40%, compared with the reference cells. This phenomenon may be attributed to the weakening effect of the carbon black fillers. The shape of the filler grains does not have a pronounced influence on the temperature profile.

Keywords: Lithium-ion battery; Thermal runaway; Micro-particulate; Nail; Impact

1. Introduction

For a large number of engineering applications, among the relevant energy storage approaches, lithium (Li) ion batteries are of the highest specific energy and the lowest specific cost [1]. For instance, by using the BacPac model [2], it can be assessed that at the cell level, a $\text{LiNi}_{0.5}\text{Mn}_{0.3}\text{Co}_{0.2}\text{O}_2$ (NMC-532) battery costs ~110 \$/(kW h) and stores ~200 W h/kg. Compared with lead-acid and nickel-metal hydride (NiMH) batteries, the specific cost is lower and the

Download English Version:

<https://daneshyari.com/en/article/5451632>

Download Persian Version:

<https://daneshyari.com/article/5451632>

[Daneshyari.com](https://daneshyari.com)