

5th Annual International Conference on Battery Safety 2014

Advancements in Systems Design, Integration & Testing for Safety & Reliability

Documentation

**Washington, DC, USA
13-14 November 2014**

ISBN: 978-1-63439-628-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by the Knowledge Foundation
All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact the Knowledge Foundation
at the address below.

Knowledge Foundation
18 Webster Street
Brookline, Massachusetts 02446-4938

Phone: (617) 232-7400
Fax: (617) 232-9171

custserv@knowledgefoundation.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

LITHIUM BATTERY POWER & BATTERY SAFETY PLENARY KEYNOTE SESSION

A Brief History of ARPA-E.....	1
<i>P. Liu</i>	
Enabling Future Technologies in Automotive Batteries - Challenges in Research and Application	22
<i>P. Lamp, O. Paschos, C. Bauer, D. Andre, B. Stiaszny, S.-J. Kim, F. Maglia, S. Lux</i>	

MITIGATING RISK FOR MOBILE SAFETY

Lithium Batteries - Air Transportation Risk	35
<i>J. McLaughlin</i>	
Li-Ion Battery Safety: Mechanisms, Thermal Runaway and Integrity of Safety Testing	56
<i>B. Barnett</i>	
Lithium Ion Intelli-Pack(R) For Launch Vehicles, Missiles, Satellites, ISS, Aircraft and UAVs - An Intelligent Power System Technology	81
<i>E. Burke</i>	
Non-compliance and Enforcement of International Lithium Battery Dangerous Goods Transport Regulations.....	93
<i>G. Kerchner</i>	
A Fail-Safe Packing Solution for the Storage, Logistics and Operational Use of Batteries.....	100
<i>Sean Luo</i>	

SAFETY CONSIDERATIONS FOR STATIONARY ENERGY STORAGE

Navigating Safety Standards for Stationary Batteries.....	106
<i>L. Florence</i>	
Engineering Systems Theory Applied to Stationary Energy Storage Safety	119
<i>D. Rosewater</i>	
Thermal Runaway Risk of Li-ion Batteries.....	127
<i>G. Hibbert</i>	
Supporting Deployment of Safe Energy Storage Systems Through Codes and Standards	135
<i>D. Conover</i>	

PREVENTATIVE DESIGNS AND PREDICTIVE MODELS

Can Cell-to-Cell Thermal Runaway Propagation in Li-ion Modules be Prevented?.....	143
<i>J. Jeevarajan, C. Lopez, J. Orieukwu</i>	
Calibration of a Homogenized Jellyroll Model Through Micro-Mechanical Tests.....	160
<i>E. Sahraei</i>	

CHARACTERISTICS OF STATE OF CHARGE

A Methodology for Studying the Effect of Overcharge on the Safety of Lithium-ion Batteries	169
<i>F. Leng, C. Tan</i>	
UL Battery Presentation: Safety Aspects of Aging Effects in Lithium-Ion Batteries	184
<i>A. Wu</i>	
Boeing 787 Battery Investigation.....	195
<i>R. Swaim, M. Bauer, A. Wu, D. Fuentevilla</i>	

MULTISCALE MODELING: SIMULATION, COMPUTATION AND ANALYTICAL TOOLS

Smart Battery Health Software for Improved Safety, Reliability and Mobility.....	213
<i>M. Rezvani</i>	
Toward Predictive Crash Modeling of Automotive Batteries.....	228
<i>J. Turner, S. Allu, S. Kalnau, A. Kumar, S. Pannala, S. Simunovic, H. Wang</i>	
Destructive Testing of Lithium Ion Cells.....	245
<i>P. McGill, J. Erickson</i>	
Towards Reconstruction of Tesla Road Debris Accident.....	265
<i>Y. Xia, T. Wierzbicki</i>	
Life Cycle Management of Advanced Battery Packs.....	278
<i>D. Spiers</i>	
Advances in Battery Management System Fault Detection for Improved Safety.....	289
<i>M. Azarian</i>	
Technologies for Detection of Internal Short Circuits in Li-ion Batteries	304
<i>B. Barnett</i>	

POSTERS

Toxic Gas Emissions of HF and POF[3] During Li-Ion Fire Tests.....	326
<i>B.-E. Mellander</i>	
Advanced Learning on Li-Ion Rechargeable Battery Safety from Detailed Examination of Component/Material Behavior Under Thermal Stress	328
<i>G. Marlair</i>	
Quality Testing for Automotive and Airspace Battery Pack Manufacturing.....	329
<i>S. Ivanov</i>	
Thermal Modeling of a Large Format Battery During PHEV Cycling	330
<i>H. Lundgren</i>	
Li-Ion Polymer Intelli-Pack Battery for Mission and Safety Critical Aerospace Battery Applications.....	331
<i>E. Burke</i>	
Risk Analysis of Lithium-Ion Energy Storage Systems in Grid Applications: A Norm-Based Approach	332
<i>M. Muller</i>	
Characterization of Thermal Runaway Propagation Within a Large Format Li-Ion Batter Module	333
<i>X. Feng</i>	
Ultrastrong, Thermally Stable Aramid Nanofiber (ANF) Membranes.....	334
<i>J. Hennessy</i>	
Thermal Runaway of Commercial 18650 Li-Ion Batteries with LFP and NCA Cathodes, Impact of SOC and Overcharge	335
<i>A. Golubkov</i>	
Looking into Cells to Manage the Risks of Using Li-Ion Batteries.....	337
<i>U. Sacken</i>	

BREAKOUT DISCUSSION

Table 1: Stationary Batteries and Grid-Tied Energy Storage Applications and Challenges	338
<i>R. Byczek</i>	
Table 2: Thermal Runaway Propagation within a Large-Format Li-Ion Battery Module	340
<i>X. Feng</i>	
Table 3: Safety in Lithium Ion Batteries: State of the Art in Separators.....	343
<i>B. Morin</i>	
Table 4: Managing Cascading Failures - Pack or Cell?	347
<i>J. Warner</i>	

ADDITIONAL PAPER

Transportation of Lithium Batteries.....	357
<i>Tim Riley</i>	
Author Index	