Lithium Ion Battery Thermal Safety and Prevention Measures

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Abstract

Lithium ion battery safety problem has attracted the whole world's attention essentially after the explosion of Samsung Note 7. This work mainly deals with the study of the generation, characteristics and prevention measures of the battery fire. Firstly, the heat generation rate of battery in the dynamic cycling was analyzed in Batteries & Fuel Cells Module and Heat Transfer Module of the COMSOL Multiphysics® software. Then a thermal abuse model was proposed in order to predict the thermal runaway of battery, which coupled the 1D electrochemical model and 3D thermal model, especially considering the material decomposition heat. Furthermore, a composite board based battery thermal management system was put forward in this work, which can effectively improve the heat dissipation capability and the heat-insulation capability of the battery pack.

Reference

[1] Qingsong Wang, et al. Heat Transfer in the Dynamic Cycling of Lithium-titanate Batteries, International Journal of Heat and Mass Transfer 93 (2016) 896–905.
[2] Qiujuan Sun, et al. Numerical study on lithium titanate battery thermal response under adiabatic condition, Energy Conversion and Management 92 (2015) 184–193.
[3] Man Chen, et al. A thermal runaway simulation on lithium titanate battery and the battery pack, Energies 8(1) (2015) 490–500.
[4] Jiajia Yan, et al. Numerical study on the thermal performance of a composite board in battery thermal management system. Applied Thermal Engineering 106 (2016) 131–140.