Lithium-ion battery venting

In this paper, the thermal runaway release gas and its flammability limit and flame propagation characteristics of ternary 18650 lithium-ion battery at SOC of 50% and 100% were studied by experiment and simulation.

Abstract: An electric vehicles used commercial prismatic battery cell with lithium nickel manganese oxide cathode was selected to research the venting process of the products released during thermal runaway.

Different thermal runaway triggering methods in battery safety accidents can lead to different outcomes. In this study, four testing methods, including side heating, nail penetration, overcharging, and oven heating, are used to trigger two types of batteries (prismatic cells and pouch cells) within a closed bomb.

Li-Ion Battery Thermal Runaway Mechanism. With the wide application of LIBs, the safety problems it brings cannot be ignored, among which the TR problem is more prominent. TR is the phenomenon of uncontrollable rising battery temperature caused by the exothermic chain reaction of LIBs [12].

When a lithium-ion battery enters into the thermal runaway, in addition to thermal hazards of the failed battery itself, a large amount of emissions with elevated temperature and high velocity will be ejected out during the venting, including gaseous, liquid and solid,

Lithium-ion batteries are widely employed in the field of new energy vehicles for their advantages such as high specific energy density and long life cycles [1, 2, 3]. However, safety issues such as frequent fire accidents mainly resulting from thermal runaways [4, 5, 6] have attracted public attention recently.

A comparative study of the venting gas of lithium-ion batteries during thermal runaway triggered by various methods. Xu et al. develop a closed reactor to test the thermal runaway characteristics of prismatic cells and pouch cells under different triggering methods.

Plated lithium with electrolyte can trigger early venting during thermal runaway. o. Side reactions cause consistent heat and gas generation during and after charging. o. Rapid gassing leads to direct venting after unreasonable fast charging. o. CO 2, CO and C 2 H 4 account for most of the generated gases at early venting stage.

This paper focuses on risks and hazards associated with venting from Li-ion batteries, currently the battery technology of choice for EV propulsion. Venting occurs when the Li-ion batteries experience internal pressure build-up due to increased vapor pressure and formation of gaseous degradation products inside the battery cell [2].

Li-ion battery thermal runaway is a critical safety issue for Electric Vehicles. The proposed global technical regulation No. 20 by the United Nations on Electric Vehicle Safety requires an advanced warning 5 minutes prior to the evolution of hazardous conditions caused by thermal runaway.

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