

Internal short circuit (ISC) is a critical cause for the dangerous thermal runaway of lithium-ion battery (LIB); thus, the accurate early-stage detection of the ISC failure is critical to improving the safety of electric vehicles. In this paper, a model-based and self-diagnostic method for online ISC detection of LIB is proposed using the measured load current and terminal ...

Lithium-ion Battery. A lithium-ion battery, also known as the Li-ion battery, is a type of secondary (rechargeable) battery composed of cells in which lithium ions move from the anode through an electrolyte to the cathode during discharge and back when charging.. The cathode is made of a composite material (an intercalated lithium compound) and defines the name of the Li-ion ...

A lithium-ion or Li-ion battery is a type of rechargeable battery that uses the reversible intercalation of Li + ions into electronically conducting solids to store energy. ... External short circuit can trigger a battery explosion. [227] Such incidents can occur when lithium-ion batteries are not disposed of through the appropriate channels ...

Early detection of internal short circuit which is main cause of thermal runaway in a lithium-ion battery is necessary to ensure battery safety for users. As a promising fault index, internal short circuit resistance can directly represent degree of the fault because it describes self-discharge phenomenon caused by the internal short circuit clearly. However, when voltages of individual ...

Internal short-circuit (ISC) faults are a common cause of thermal runaway in lithium-ion batteries (LIBs), which greatly endangers the safety of LIBs. Different LIBs have common features related to ISC faults. Due to the insufficient volume of acquired ISC fault data, conventional machine learning models could not effectively identify ISC faults. To compensate ...

Thermal runaway is a critical safety challenge for widely used Li-ion batteries. 1-3 It has resulted in catastrophic field failures involving consumer electronics, 4-6 electric vehicles, 1,2 aerospace, 7 stationary energy storage systems 8,9 and various other applications. 10 Several high-profile thermal runaway incidents have been found due to internal short circuit (ISC) of ...

Internal short circuit (ISC) of lithium-ion battery is one of the most common reasons for thermal runaway, commonly caused by mechanical abuse, electrical abuse and thermal abuse. This study comprehensively summarizes the inducement, detection and prevention of the ISC. Firstly, the fault tree is utilized to analyze the ISC inducement ...

The internal short circuit (ISC) in lithium-ion batteries is a serious problem since it is probably the most common cause of a thermal runaway (TR) that still presents many open questions, even though it has been

intensively ...

External short circuit has a severe influence on lithium battery's performance. Currently, a huge study has focused on the single battery's short circuit. However, cells are often interconnected into a module in real applications. There are many possibilities that external short circuit of a single cell has huge impact on the other cells in a battery module. In this research, ...

Series arc-induced internal short circuit leading to thermal runaway in lithium-ion battery. Author links open overlay panel Wenqiang Xu a b, Kai Zhou a, Hewu Wang b, Languang Lu b, Yu Wu c, Bin Gao a b ... which resulted in the voltage drop in the battery. The high short circuit current caused localized instantaneous high temperatures in the ...

Charge-discharge tests under normal operating conditions showed only a minor effect of polymer on lithium-ion battery performance. Short-circuit testing of LiFePO₄-based coin cells with the protective layer (quasi-isothermal ...

In this work, a simultaneously coupled mechanical-electrochemical-thermal model of a pouch battery is developed based on commercial software COMSOL Multiphysics, 27 to predict short circuit and mechanical-electrochemical-thermal coupling behavior caused by mechanical indentation, as shown in Fig. 1. The coupled model consists of four sub-models: a ...

Generalized separator failure criteria for internal short circuit of lithium-ion battery. J Power Sources, 467 (2020), Article 228360. View PDF View article View in Scopus Google Scholar [21] M. Liu, Z. Zeng, W. Zhong, Z. Ge, L. Li, S. Lei, et al.

Lithium-ion (Li-ion) batteries have been widely used in a wide range of applications such as portable electronics, vehicles, and energy storage, thanks to their high energy density, long lifespan, low self-discharging rate, and wide temperature range [1], [2]. However, the internal short circuit (ISC) in Li-ion batteries, commonly regarded as the main reason leading to ...

Micro-short circuit (MSC) of a lithium-ion battery cell is a potential safety hazard for battery packs. How to identify the cell with MSC in the latent phase before a thermal runaway becomes a difficult problem to solve. We propose a diagnosis method to detect the MSC according to the remaining charging capacity (RCC) variations between cells.

Soft short-circuit (SC) detection can be, for instance, carried out by thermal analysis. In [15], a 3D electrochemical-thermal model is built to simulate various ISC scenarios and ISC detection is addressed from model parameterization and parameter estimation perspective [16], residual-based battery thermal fault detection is achieved based on non-linear observers and ...

The battery failure always occurs with internal short circuit (ISC) [4], [8]. The ISC caused by manufacturing

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defect is believed to be the root cause of both the accidents of the power batteries for Boeing 787 in 2013 and the explosion accidents of the mobile phone batteries for Samsung Galaxy Note 7 in 2016 [9], [10]. Generally, the ISC occurs when an electronic ...

The internal short circuit (ISC) in lithium-ion batteries is a serious problem since it is probably the most common cause of a thermal runaway (TR) that still presents many open questions, even though it has been intensively investigated. Therefore, this article focusses on the generation and characterisation of the local single-layer ISC, which is typically caused by cell ...

Fast and precise detection of internal short circuit on Li-ion battery. 2018 IEEE Energy Conversion Congress and Exposition (ECCE) 10th IEEE Annual Energy Conversion ... Fault diagnosis and quantitative analysis of micro-short circuits for lithium-ion batteries in battery packs. J. Power Sources, 395 (2018), pp. 358-368. View PDF View article ...

Charge-discharge tests under normal operating conditions showed only a minor effect of polymer on lithium-ion battery performance. Short-circuit testing of LiFePO₄-based coin cells with the protective layer (quasi-isothermal conditions) shows that the polymer provides a several-fold short-circuit current decrease, which is caused by a drop ...

Battery safety risks can be caused by a number of factors, including overcharging, overdischarging, overheating, short circuits, etc. [[4], [5], [6]]. Overcharging, overdischarging and overheating can be protected by the battery management system, where the key is the protection threshold setting of voltage and temperature.

Safety is the first priority in lithium ion (Li-ion) battery applications. A large portion of electrical and thermal hazards caused by Li-ion battery is associated with short circuit. In this paper, both external and internal short circuit tests are conducted. Li-ion batteries and battery packs of different capacities are used.

Zhou et al. [23] conducted experiments on lithium-ion batteries with different initial states of charge, establishing an internal correlation between acoustic measurements and electrode and temperature measurements during the external short-circuit process. Through the selection of appropriate time frequency domain acoustic characteristic parameters, the acoustic response ...

Internal short circuit (ISC) fault can significantly degrade a lithium-ion battery's lifetime, and in severe cases can lead to fatal safety accidents. Therefore, it is critical to diagnose the ISC fault in its early stage for preventing early ISC from evolving into serious safety accidents. In this article, we develop a purely data-driven method using machine learning algorithms for ...

Model-based fault diagnosis approach on external short circuit of lithium-ion battery used in electric vehicles. Appl. Energy, 184 (2016), pp. 365-374. View PDF View article ... detection, and prevention of the internal short circuit in lithium-ion batteries: recent advances and perspectives. Energy Storage Mater., 35 (2021), pp.

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470-499. View ...

The internal short circuit of the lithium ion battery (LIB) is one of the main reasons that cause thermal runaway. Mechanical, thermal, and electrical abuse of LIBs may lead to irreversible growth of lithium dendrites. Short circuits will happen inside the battery if the separator is pierced by the lithium dendrites growing to a certain extent.

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