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The impact of temperature on lithium battery pack

Overview

Unlike most electronic integrated circuits and microchips in electric vehicles, which operate best at -40˚C to 85˚C or higher, the optimal temperature range for li-ion battery packs is quite narrow and varies depending upon cell supplier, charge and discharge mode and other factors.How does temperature affect lithium ion batteries?

As rechargeable batteries, lithium-ion batteries serve as power sources in various application systems. Temperature, as a critical factor, significantly impacts on the performance of lithium-ion batteries and also limits the application of lithium-ion batteries. Moreover, different temperature conditions result in different adverse effects.

Do structural parameters affect the thermal performance of lithium-ion batteries?

However, the thermal performance of lithium-ion batteries is a major concern, as overheating can lead to safety hazards. This study aims to investigate the impact of structural parameters on the temperature field of battery packs, with a focus on, the width of wedge-shaped channels, inclination angles, and gaps between battery cells.

What factors influence the thermal behavior of lithium-ion battery packs?

The findings affirm that the discharge rate is the most influential parameter shaping the thermal behavior of lithium-ion battery packs. The thermal properties of a battery pack are greatly affected by its electrical setup, standing as the second most influential factor.

How does thermal resistance affect a Li-ion battery pack?

This study performs a numerical analysis of the thermal conditions in a Li-ion battery pack at moderate values of external factors affecting the thermal runaway and typical discharge rates for this type of CCS. Thermal resistance between Li-ion battery and the battery pack case was found to greatly reduce heat exchange with the environment.

How does self-production of heat affect the temperature of lithium batteries?

The self-production of heat during operation can elevate the temperature of LIBs from inside. The transfer of heat from interior to exterior of batteries is difficult due to the multilayered structures and low coefficients of thermal conductivity of battery components , , .

How does discharge rate affect thermal performance of lithium-ion batteries?

Discharge rate showed the highest contribution followed by electrical configuration. Discharge rate impacts T max by 44 % and ΔT max by 58.2 %. Proposed optimum condition for thermal performance of LIB pack. Lithium-ion batteries are increasingly preferred for energy storage, particularly in Electric Vehicles (EVs).

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