

Internal circulation heat dissipation of liquid flow batteries in communication base stations





Overview

How to improve heat dissipation efficiency of battery liquid cooling thermal system?

To improve the heat dissipation efficiency of the battery liquid cooling thermal system (BLCS), numerous scholars have conducted a lot of research on the coolant runner structure of the liquid-cooled plate. The related studies can be categorized into two types, i.e., conventional runner structure and bionic runner structure.

Does immersion liquid cooling reduce heat dissipation requirements of battery modules?

Satyanarayana et al. (Satyanarayana et al., 2023) examined the cooling effects of natural air cooling, forced air cooling and immersion liquid cooling on battery modules, and the results demonstrated that only immersion liquid cooling could meet the heat dissipation requirements of the battery module under high-rate cycling circumstances.

What is BTMS heat dissipation?

For a long time, many scholars have been devoted to the research of the most advanced battery thermal management system (BTMS), and the current main heat dissipation methods include air cooling, liquid cooling, heat pipe cooling and phase change material cooling .

Can inlet temperature and flow rate be adjusted to control heat dissipation intensity?

The above results demonstrate that the inlet temperature and flow rate can be actively adjusted to control the heat dissipation intensity of the FFIC. In other words, when the battery is working normally, a low inlet flow rate and high inlet temperature can be selected to reduce the operation energy consumption.

What is the temperature difference between BLCS and battery module?



The lower the T_c , the lower the temperature of the battery module, but when the T_c is lower than 24 °C, the maximum temperature difference will be more than 5 °C, affecting the temperature uniformity between modules. The results show that the BLCS at $D = 4 \text{ mm}$, $V_c = 0.5 \text{ m}\cdot\text{s}^{-1}$, and $T_c = 28 \text{ °C}$ has better heat dissipation performance.

Why does the inlet flow rate increase heat dissipation?

This is mainly due to that increasing the inlet flow rate will enhance heat convection with respect to the coolant and the battery, increasing heat dissipation and lowering the battery temperature.



Internal circulation heat dissipation of liquid flow batteries in comm



Flexible, Highly Thermally Conductive and Electrically Insulating ...

However, with the significant growth in energy consumption of 5G base stations, existing heat dissipation technologies can hardly fulfill the operation requirements of 5G ...

Adaptive battery thermal management systems in unsteady ...

Since the heat generation in the battery is determined by the real-time operating conditions, the battery temperature is essentially controlled by the real-time heat dissipation ...



Performance evaluation on liquid-PCM hybrid battery

To enhance the cooling and preheating performance of the battery, a novel hybrid battery thermal management system (BTMS) containing bionic spiral fins wrapped with phase ...



Analysis of Heat Dissipation Performance Based on Fluid Flow ...

In this study, we analyzed the temperature distribution and cooling performance of battery cells by applying various thicknesses of Baffle structures in a water-cooling system.



Efficient Heat Dissipation Methods for Electronic ...

Conclusion Efficient heat dissipation of electronic components is not only a technical challenge but also a core task to ensure the performance ...



Enclosure Air Circulation:

While typically a small value, this will add to the overall heat load being generated within the enclosure. Additionally, consider rotating or adjusting the internal ...



Backup Battery Cooling for Radio Base Stations

Different ways of cooling currently used at Ericsson AB are presented in this paper, including different ways of improving the cooling system performance. By testing, the variation of battery ...





Thermal characteristics and reliability analysis of liquid-cooled ...

In order to solve the problems of temperature rise and high-power consumption in the battery pack where the traditional runner liquid cooling plate is located, this paper draws ...



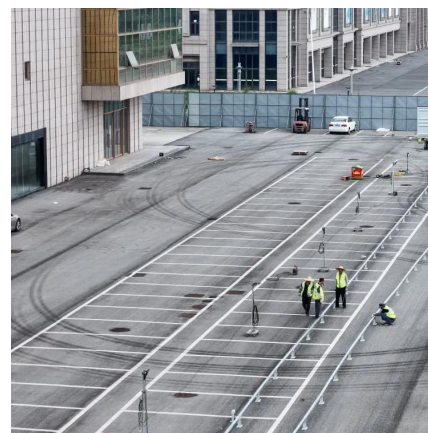
Thermal characteristics and reliability analysis of liquid-cooled heat

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Flexible, Highly Thermally Conductive and Electrically Insulating ...

However, with the significant growth in energy consumption of 5G base stations, existing heat dissipation technologies can hardly fulfill the operation requirements of 5G hardware systems.



CN116960520A

The invention discloses an internal diversion circulation heat dissipation type battery module, which comprises a base, wherein a circulation assembly for cooling the base is mounted



Research on the Influence of Liquid on Heat Dissipation and ...

To find the influence factors of the BTMS on heat dissipation and heating characteristics, we selected and simulated three parameters: inlet size, liquid flow rate, and ...



Modeling and Analysis of Heat Dissipation for Liquid Cooling

To ensure optimum working conditions for lithium-ion batteries, a numerical study is carried out for three-dimensional temperature distribution of a battery liquid cooling system in ...

Cooling for Mobile Base Stations and Cell Towers

BackgroundUnattended base stations require an intelligent cooling system because of the strain they are exposed to. The sensitive telecom equipment is ...



Optimization of the Heat Dissipation Performance of a ...

In view of the harsh conditions of rapid charging and discharging of electric vehicles, a hybrid lithium-ion battery thermal management system combining ...



Utilizing Metal Core PCBs for Enhanced Thermal Dissipation in Base Stations

This real-world example highlights how a heat dissipation PCB like an aluminium PCB can transform base station reliability, even under challenging conditions. Key takeaway: ...



Numerical study on heat dissipation and structure optimization of

In this study, the numerical model is first established to comprehensively compare the cooling characteristics of the three modes, and the effects of the battery spacing, inlet ...



Heat dissipation optimization of lithium-ion battery pack based on

The excessively high temperature of lithium-ion battery greatly affects battery working performance. To improve the heat dissipation of battery pack, many researches have ...



Comprehensive review of thermal management strategies for ...

3 days ago· This review describes the working principle and heat generation mechanism of lithium-ion batteries, as well as the triggering and hazards of thermal runaway, and presents ...



Experimental Analysis of Battery Cell Heating Through ...

This study presents an experimental analysis of a battery thermal management system (BTMS) incorporating electromagnetic induction heating ...



Numerical simulation of flow and heat transfer characteristics of ...

In response to the current high demand for communication, additional communication base stations are being constructed, leading to more stringent heat dissipation ...

Research on the Influence of Liquid on Heat ...

To find the influence factors of the BTMS on heat dissipation and heating characteristics, we selected and simulated three parameters: inlet ...



Experimental Analysis of Battery Cell Heating Through

This study presents an experimental analysis of a battery thermal management system (BTMS) incorporating electromagnetic induction heating and a fluid-based heat ...



Investigation of the heat generation of liquid metal battery during

Investigation of the heat generation of liquid metal battery during internal short circuit
Published in: 2024 IEEE Energy Conversion Congress and Exposition (ECCE)

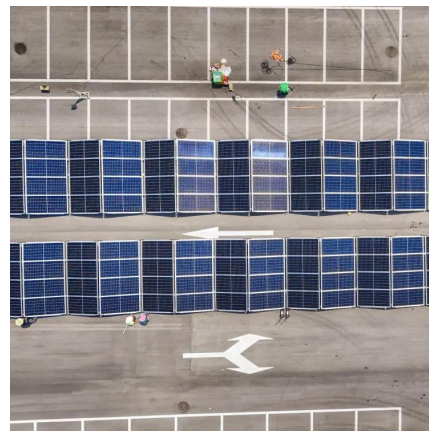


Optimization of the Heat Dissipation Performance of a Lithium-Ion

In view of the harsh conditions of rapid charging and discharging of electric vehicles, a hybrid lithium-ion battery thermal management system combining composite phase change material ...

ENERGY-SAVING MEASURES AND TEMPERATURE ...

operation performance of a heat pipe heat exchanger unit with pump drive circuit for heat dis-sipation in a small data center. Yue et al. [4] established a mathematics model of the micro ...



Thermal characteristics and reliability analysis of liquid-cooled heat

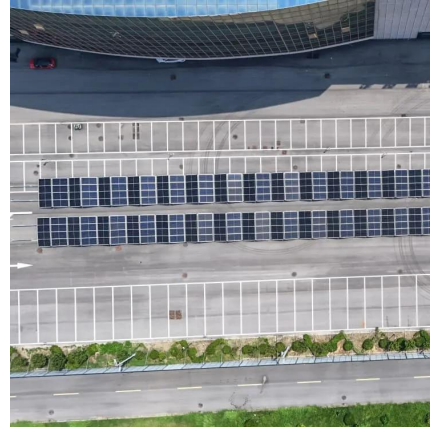
Especially for large-scale battery pack heat dissipation, liquid cooling plate layout and the influence of thermal liner on the heat dissipation performance, to provide a more ...



STUDY ON AN ENERGY-SAVING THERMAL

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In order to solve the poor heat dissipation in the outdoor mobile communication base station, especially in summer, high temperature alarm phenomenon occurs frequently, affecting the ...



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