Lithium battery immersion cooling

Immersion cooling for lithium-ion batteries - A review Charlotte Roe a, Xuning Feng b, Gavin ... o Performance of battery immersion cooling and different cooling fluids reviewed. o Immersion ...

In this study, fluorinated liquid immersion cooling as a new cooling scheme has been tested and discussed for cooling the 18650 lithium-ion battery (LIB). SF33, with the boiling point of 33.4 °C, is chosen as the liquid for the immersion cooling. Comparison of the SF33 immersion cooling and forced air cooling (FAC) for the 18650 LIB under 2C, 4C and dynamic ...

Numerical analysis of single-phase liquid immersion cooling for lithium-ion battery thermal management using different dielectric fluids. Int. J. Heat Mass Transf., 188 (2022), Article 122608. View PDF View article View in Scopus Google Scholar [28] X. Tan, P. Lyu, Y. Fan, J. Rao, K. Ouyang. Numerical investigation of the direct liquid cooling of a fast ...

Experimental investigations of liquid immersion cooling for 18650 lithium-ion battery pack under fast charging conditions Author links open overlay panel Yang Li a, Minli Bai a, Zhifu Zhou b, Wei-Tao Wu c, Jizu Lv a, Linsong Gao a, Heng Huang a, Yulong Li a, Yubai Li a, Yongchen Song a

The successful thermal management of lithium-ion batteries as used in electric vehicles is crucial in maximizing their performance and lifespan. Direct contact liquid cooling, in particular two-phase immersion cooling, is viewed as a potential means of providing enhanced heat transfer and thermal homogenization within a battery pack. This study experimentally ...

4 · In this paper, a battery thermal management system (BTMS) with immersion cooling was designed by immersing the lithium-ion cells in the non-conductive coolant--dimethyl ...

This study aims to ascertain the effectiveness of immersion cooling of lithium-ion cells by experimentally examining the thermal and electrical response of a single ...

This review therefore presents the current state-of-the-art in immersion cooling of lithium-ion batteries, discussing the performance implications of immersion cooling but also identifying gaps in ...

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To summarize, this study demonstrated the dielectric fluid immersion cooling assisted with tab cooling as a safe and efficient thermal management technology for high-density and high capacity lithium-ion battery and battery pack application in electric vehicles. The discussions in this work have been mainly for pouch type cells. Yet, the ...

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A new battery pack structure in the shape of a Z was suggested by Xi et al. for the use of large, laminated lithium-ion batteries in new energy vehicles" optimized air cooling, improving cooling with deflector spoilers and rounded chamfers. Spoilers redirect airflow, enhancing heat transfer. Rounded chamfers reduce turbulence and dead space, improving hot ...

We design and fabricate a novel lithium-ion battery system based on direct contact liquid cooling to fulfill the application requirement for the high-safety and long-range of electric vehicles.

This paper can provide a reference for designing an immersion cooling system for electrochemical energy storage systems. Key words: lithium-ion battery, battery thermal ...

Solai et al. proposed a numerical model to simulate heat transfer and electric performances of Li-ion battery packs with immersion cooling. The temperature, voltage, current, and state of health are evaluated ...

Single-phase static immersion cooling for cylindrical lithium-ion battery module. / Liu, Yanhui; Aldan, Gulzhan; Huang, Xinyan et al. In: Applied Thermal Engineering, Vol. 233, 121184, 10.2023. Research output: Journal article publication > Journal article > Academic research > peer-review

However, current methods for the immersion cooling of lithium-ion batteries have not yet been widely industrialized, and only a few companies have introduced demonstration products. For example, the company TotalEnergies from France replaced the battery cooling system in the Volvo XC90 plug-in hybrid vehicle with an immersion cooling solution, which increased the ...

Battery thermal management system (BTMS) is very critical to a high-performance electric vehicle. Compared with other cooling methods, the immersion cooling with heat transfer efficiency has received comprehensive attentions recently, especially that with single-phase insulating oil, since it can not only guarantee the heat transfer efficiency but also ...

Five different types of dielectric coolants were used to study the cooling performance of the battery module at high discharging rates (4C, 6C, and 8C). To make a ...

Abstract. Overheating of Li-ion cells and battery packs is an ongoing technological challenge for electrochemical energy conversion and storage, including in electric vehicles. Immersion cooling is a promising thermal management technique to address these challenges. This work presents experimental and theoretical analysis of the thermal and ...

A two-phase liquid immersion cooling system for lithium batteries is proposed. Four cooling strategies are compared: natural cooling, forced convection, mineral ...

Immersed thermal management shows distinct advantages while cooling the lithium-ion battery modules. This work conducts numerical-experimental studies to analyze the significance of optimizing system configurations

and operational modes by using immersion thermal management. Numerically and experimentally, the effects of batteries" staggered ...

In our previous study [13], we proposed a novel liquid immersion system for cooling 18650 lithium-ion batteries. The findings indicate that the implementation of two-phase immersion cooling demonstrated remarkable efficacy in maintaining the cell temperature below 34 °C across all tested conditions. Currently, numerous immersion liquid cooling ...

Moreover, FFIC reduces temperature rise by 51 % compared with natural air convection and 35 % compared with static flow immersion cooling (SFIC) in the 4S2P lithium-ion battery pack. Also, the practical significance of the SEO-based FFIC immersion cooling technique is assessed across extreme climate zones such as -10 °C and 40 °C and ...

Liquid immersion cooling has gained traction as a potential solution for cooling lithium-ion batteries due to its superior characteristics. Compared to other cooling methods, it boasts a high heat transfer coefficient, even temperature dispersion, and a simpler cooling system design [2].

Thermal Management of Li-Ion Batteries With Single-Phase Liquid Immersion Cooling Abstract: Development of effective thermal management techniques is essential in enabling further technical advances and wide public acceptance of lithium-ion based battery electrical storage. Both stationary battery arrays and electric vehicle (EV) batteries ...

In the present work, a comparative study of the different cooling methods, namely, forced air cooling (FAC), direct liquid contact cooling (i.e., Mineral oil cooling (MOC), and therminol oil cooling (TOC)) with low-cost coolants have been carried out on 20 cells of 10Ah lithium-ion battery-stack at a discharge rate of 1C, 1.5C, 2C, 2.5C, and 3C. It is found that the ...

Ensuring the lithium-ion batteries" safety and performance poses a major challenge for electric vehicles. To address this challenge, a liquid immersion battery thermal management system utilizing a novel multi-inlet collaborative pulse control strategy is developed.