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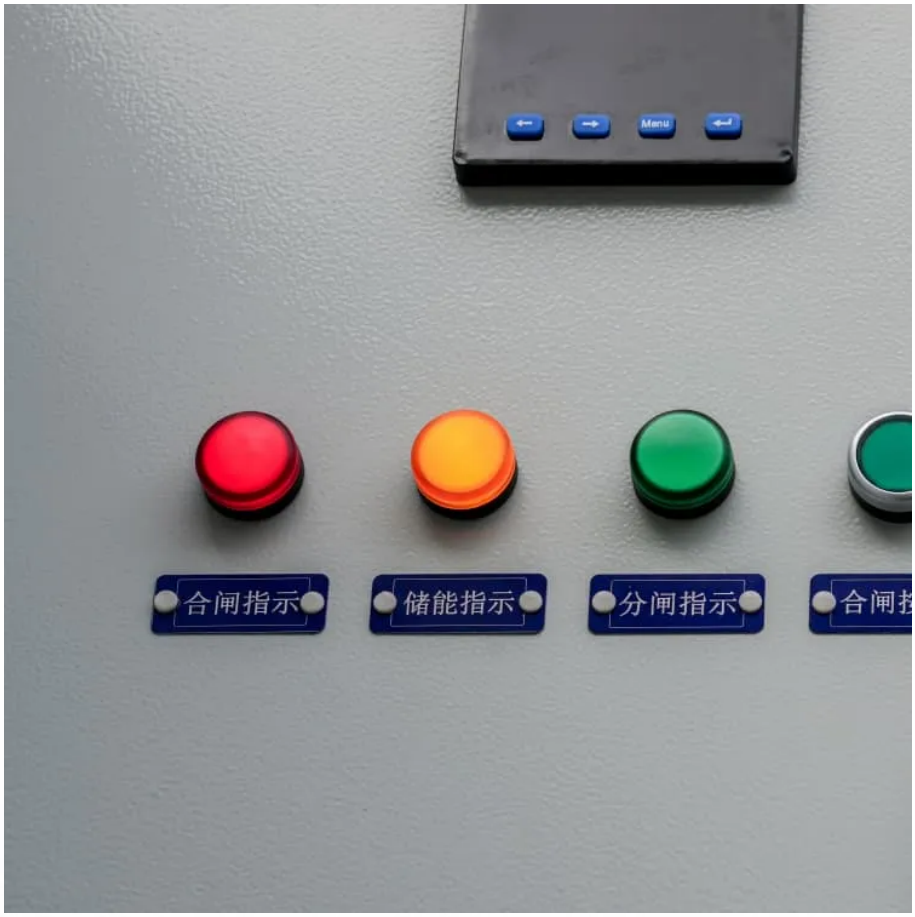
Flow battery module design



Overview

This paper presents a comprehensive overview of the critical considerations in battery module design, including system requirements, cell selection, mechanical integration, thermal management, and safety components such as the Battery Disconnect Unit (BDU) and Battery Management System (BMS).What is a battery design module?

The Battery Design Module includes two predefined multiphysics interface that couples fluid flow in porous media with mass transport and reactions in porous media.

How can flow fields improve battery performance?

Current design studies based on flow fields summarize several key considerations: (1) Enhancing the uniformity of active species within the electrode through flow fields design is crucial for improving battery performance.

Does flow field structure affect pressure drop of battery?

Besides, flow field structure also has a great influence in pressure drop of the battery. Better flow field not only can improve the mass transport in electrode but also is able to decrease the pressure drop of RFB.

What is flow field design for redox flow battery (RFB)?

Prospects of flow field design for RFB have been exhibited. Flow field is an important component for redox flow battery (RFB), which plays a great role in electrolyte flow and species distribution in porous electrode to enhance the mass transport. Besides, flow field structure also has a great influence in pressure drop of the battery.

How do flow fields affect distribution in single battery and stack?

However, the effects of flow fields on distribution in single battery and in stack are different. The distribution uniformity is decreased in the order of IFF >

SSFF>No-FF for single battery while the distribution uniformity along cell number is decreased in the order of No-FF > SSFF>IFF for stack.

Are redox flow batteries a frontier technology?

Frontier technologies for key components of redox flow battery stacks are summarized. Stack integration systems for redox flow battery are overviewed. Innovative design and optimization on key components are highlighted. Challenges and prospects for the design of large-scale energy storage in flow batteries are presented.

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