SolarInnovate Energy Solutions

Battery module pack research and development

Overview

This article presents a holistic engineering design and simulation strategy for a future advanced battery pack and its parts by assimilating paradigmatic solutions for cell material selection, component design, cell clustering, thermal management, battery monitoring, and recycling aspects of the battery and its components.What are the multidisciplinary aspects of battery pack design?

So far, there are few research studies that circumscribed all the multidisciplinary aspects (cell material selection, cell-electrode design, cell clustering, state of health (SOH) estimation, thermal management, cell monitoring, and recycling) simultaneously for battery packs in electric vehicles (EVs).

What is battery pack development?

As electric vehicles (EVs) revolutionize mobility, battery pack development stands at the forefront of this transition. Original Equipment Manufacturers (OEMs) now strive for deeper control over the value chain, from Battery Management Systems (BMS) to fundamental design capabilities.

Can thermal analysis be integrated into a battery pack study?

This approach was one of the first studies that integrated one cell's thermal analysis into a complete battery pack study. The final scope of this research was to find a design approach to provide temperature uniformity in a battery pack with cylindrical cells. Li and Mazzola published an advanced battery pack model for automotive.

How can battery packaging design improve battery safety?

A robust and strategic battery packaging design should also address these issues, including thermal runaway, vibration isolation, and crash safety at the cell and pack level. Therefore, battery safety needs to be evaluated using a multi-disciplinary approach.

Can a design approach provide temperature uniformity in a battery pack?

The final scope of this research was to find a design approach to provide temperature uniformity in a battery pack with cylindrical cells. Li and Mazzola published an advanced battery pack model for automotive. Their research is based on an equivalent electrical scheme of the whole battery pack.

Is battery design a multi-disciplinary activity?

Nowadays, battery design must be considered a multi-disciplinary activity focused on product sustainability in terms of environmental impacts and cost. The paper reviews the design tools and methods in the context of Li-ion battery packs. The discussion focuses on different aspects, from thermal analysis to management and safety.

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