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Safety Vent Design for Li-ion Batteries

Burst-disk Li-ion vent design interrupts current and reduces thermal runaway risk in EV and grid batteries.

Despite their wide adoption for use in electric vehicles and energy storage systems, it is possible for Li-ion batteries to ignite due to the production of flammable gases that occur under adverse conditions. While battery cells are generally manufactured with a built-in safety vent to prevent pressure buildup, traditional venting approaches do not mitigate the risk of a fire spreading from one cell to another, throughout the battery pack. To address this problem and create a battery pack that is more resistant to individual cell failures, researchers at Purdue University have developed a design for battery cell venting that minimizes heat transfer to adjacent surfaces. The design has a burst disk that breaks when battery temperature (and pressure) increases. Breakage of the burst disk also severs its connection with the current collector, practically serving as a current interrupt device (CID). The current collector is designed to reduce heat transfer from jet impingement on nearby surfaces, as opposed to prior approaches which do not consider the fluid dynamics and heat transfer of venting. This technology can be used to improve the safety and resilience of Li-ion battery systems, including those found in electric vehicles and home/grid scale energy storage systems.

Advantages

-Safer Li-Ion batteries

-Better cooling during failure events

-Reduces risk of damage propagation to other cells

-Prevents thermal runaway

Applications

-Li-Ion Batteries

-Electric Vehicles

Technology ID

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Category

Energy & Power Systems/Energy Storage

Computing/Networking & Connectivity

Automotive & Mobility

Tech/Micromobility & Smart Urban Infrastructure

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-Energy Storage Systems

Technology Validation:

This technology is in the conceptual stages.

TRL: 2

Intellectual Property:

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