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Helping reduce thermal runaway through bench-to-bench collaboration

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In the ever-changing world of electric vehicle lithium-ion batteries, reducing cell-to-cell thermal runaway propagation takes close collaboration between OEMs and barrier material suppliers. Battery experts at 3M will work bench-to-bench with you to help you assess and select barrier materials, pivot to new solutions based on evolving requirements and customize barrier materials to meet your specific design needs.

The complex challenges of thermal runaway reduction

Thermal runaway barrier materials for use in electric vehicle lithium-ion batteries need to combine multiple key properties in an extremely small package. They must withstand extreme temperatures and exhibit low thermal conductivity to help slow propagation between cells. They must provide good dielectric properties as well as robust compression to accommodate volumetric expansion that occurs over the lifespan of the cells.

What's more, they must do all this while complying with rigid space and weight constraints. Electric vehicle OEMs are constantly pushing the limits of battery energy density by packing more and more cells into tighter and tighter battery designs. Any space dedicated to barrier materials is space that does not directly contribute to energy density or vehicle driving range.

Developing space-efficient thermal runaway barrier materials to balance these key properties is a complex,

multi-faceted process. Design requirements frequently evolve throughout the development process, with conventional barrier materials often struggling to keep up.

What's needed are advanced barrier material solutions tailored to the precise requirements of specific cell and battery designs. This can be achieved through close, extensive and agile collaboration between the OEM and barrier material supplier.

3M works with OEMs on barrier materials

Battery and materials science experts at 3M have extensive experience working with electric vehicle OEMs to help tailor, improve and refine between-cell battery barrier materials. Special lines of 3M™ Thermal Runaway Barrier 600 and 700 Series have been developed to help OEMs meet key requirements such as high temperature stability and thermal insulation. Advanced, highly customizable thermal barrier can offer powerful capacity to help reduce thermal runaway propagation while taking up minimal between-cell space.

3M has worked with OEMs to help negotiate tolerances and accelerate completion while understanding that each battery design has unique requirements. In addition to thermal properties, other key barrier material requirements have included low weight and thickness, customizable encapsulation, design flexibility, and easy handling and assembly. With global capabilities and source of supply, 3M can enable rapid scaling and efficiency improvements

in the global manufacturing process to help support significant volume increases while navigating supply chain constraints.

Additional product details

3M™ Thermal Runaway Barrier 600 and 700 Series is a series of ceramic fiber matrix mats filled with intumescent filler. Combining high temperature stability (up to 1,200°C) with high electrical resistance and a thermal conductivity of < 0.045 W/m-K at 25°C (mat only), these barrier materials can help slow down heat transfer from one cell to the next.

Additionally, the compressible material allows for flexibility as battery cells expand and shrink during cell cycling. The material can fit into specific gaps and accommodate specific pressures during assembly and operation.

For more information, see the [technical data sheet](#).

3M reserves exclusive EV battery technologies for select customers actively innovating in this area.
[Click here to request an in-person meeting to discuss and learn more.](#)

[3M.com/evbattery](https://www.3m.com/evbattery)

Intended Use: These products are intended for use within a high voltage lithium-ion battery pack to help address the spread of heat that occurs during thermal runaway propagation in automotive, off-highway, industrial and marine battery applications. Since there are many factors that can affect a product's use, the customer remains responsible for determining whether the 3M product is suitable and appropriate for the customer's specific application and system, including customer conducting an appropriate risk assessment and evaluating the 3M product in customer's application and system.

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