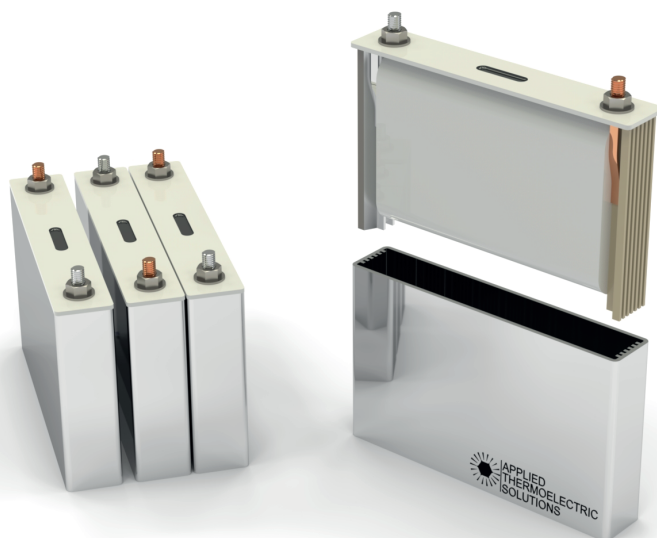


High-Heat Transfer (HHT) Batteries

By Applied Thermoelectric Solutions LLC

High-Heat Transfer (HHT) — also known as ParaThermic® battery architecture — represents a breakthrough in electric vehicle (EV) battery design. By reengineering the internal structure rather than altering the chemistry, HHT batteries eliminate internal heat bottlenecks that limit charging speed, safety, and lifespan. This innovation enables faster charging, better cold-weather performance, and at least three times longer life compared to conventional designs.



Core Design Innovations



In-plane heat transfer pathways
(~32× higher thermal conductivity)



Electrically isolated thermal bridges for rapid heat spreading



Optimized cell geometry for maximum cooling efficiency



Low-resistance ultrasonic welds with thin dielectric coatings

Modeling and Validation

Thermal modeling and validation demonstrate 1.3–2.6× improvement in heat removal using existing cell geometry, and up to 20× improvement with optimized aspect ratios. These results show that HHT designs can overcome internal thermal limits that traditional cooling methods cannot.

Key Benefits

Ultra-fast charging

Supports heat generation rates equivalent to 3.5 minute full charges.

Enhanced safety

Structural design supports heat removal rates greater than heat generation during the onset of thermal runaway, preventing or delaying runaway conditions.

Improved cold-weather operation

Achieves preheating in 1–8 minutes (vs. ~14 minutes today).

Extended battery life

At least 3× longer life through reduced gradients, lower average temperature, and less time at elevated temperature.

Next Steps

Applied Thermoelectric Solutions is seeking partnerships with OEMs and battery developers to prototype and validate HHT technology, and to explore future licensing opportunities. The goal is to demonstrate manufacturability, scalability, and integration into next-generation EV platforms.