

Student Thesis

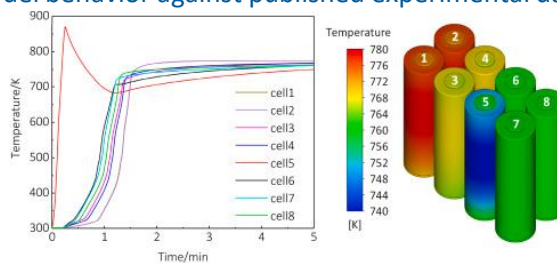
“Simulating the thermal runaway (TR) on Li-Ion Battery with analysis of materials for TR propagation mitigation.”

Description:

This thesis investigates the thermal runaway (TR) behavior of lithium-ion batteries through numerical simulation and evaluates the effectiveness of protective materials in preventing TR propagation between neighboring cells. Using a coupled modeling approach, the study combines reaction-kinetics-based thermal abuse modeling with detailed heat-transfer simulations to capture both the internal exothermic reactions driving TR and the external thermal interactions within a battery module. Various mitigation materials, such as phase change material (PCM), thermal barriers, and insulating layers, will be analyzed to determine their influence on heat absorption, delay of temperature rise, and suppression of propagation.

Your Tasks:

- Developed a thermal runaway simulation framework in ANSYS Fluent.
- Implement and calibrate the thermal abuse model using literature.
- Simulate TR initiation in a single “trigger cell” and analyze heat transfer to neighboring cells.
- Evaluate the effectiveness of different mitigation materials (PCM, thermal barriers, insulation).
- Validate model behavior against published experimental data where possible.



Ref: Prevention and suppression effect of PCM on TR, Ni et al.

Your Profile:

- Basic knowledge of battery technology and thermal runaway phenomenon.
- Interest and understanding of simulation tool.
- Nice to have: Prior experience with Ansys Fluent or another workbench

Interest? Questions? – Contact us!

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