

Predicting and Mitigating Cascading Failure of Thermal Runaway in Stacks of Li-Ion Pouch Cells

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If a lithium-ion cell in a large-scale energy storage system goes into thermal runaway, there is a possibility that thermal runaway will cascade through the system. While losses and heat release associated with single cells are modest, cascading failure is much more severe. An understanding of the heat losses and heat transfer pathways from a cell or stack of cells undergoing thermal runaway is important to informing mitigation strategies. We discuss recent measurements of cascading failure in stacks of pouch cells including some passive thermal mitigation approaches that successfully inhibit propagation. We also describe predictions of cascading thermal runaway in a finite-element code framework. Results cover some of the sensitive parameters involved in these predictions and our attempts to determine values for those parameters. Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND No. SAND2019-3853 A