

UNDERWRITERS LABORATORIES®

Battery Safety Science Symposium

August 11, 2021

Session III

Empirical and Modeling Studies: New Insights

Dr. Ankur Jain

Associate Professor, Department of Mechanical and
Aerospace Engineering

The University of Texas at Arlington



Safety of Li-ion Cells and Battery Packs: A Heat Transfer Perspective

Safety-related problems in Li-ion cells and battery packs are well-known. A fundamental understanding of the nature of heat generation and heat transfer in Li-ion materials, cells and battery packs is critically needed for understanding and solving such multi-scale and multi-disciplinary problems.

This seminar will provide a heat transfer perspective on the problem of Li-ion battery safety. Fundamental scientific reasons behind the poor thermal characteristics of a Li-ion cell – originating in nano- and micro-scale thermal transport in Li-ion materials and interfaces – will be presented. Research literature related to mitigation techniques will be discussed. The problem of thermal runaway propagation in a Li-ion battery pack will be discussed in detail. Recent work on non-linear simulations accounting for radiative heat transfer in a battery pack will be discussed. It will be shown that a careful thermal design of the battery pack may help mitigate several thermal runaway propagation related challenges.

About the speaker

Dr. Ankur Jain is an Associate Professor in the Mechanical and Aerospace Engineering Department at the University of Texas, Arlington. His research interests include heat transfer in Li-ion batteries, microscale thermal transport, additive manufacturing and applied mathematics. He has published 90 journal papers, and given 51 invited talks, seminars and tutorials. He received the UT Arlington College of Engineering Lockheed Martin Excellence in Teaching Award (2018), UT Arlington College of Engineering Outstanding Early Career Award (2017), NSF CAREER Award (2016) and the ASME EPP Division Young Engineer of the Year Award (2013). In 2017, he was invited by the US National Academy of Sciences to participate in the 5th Arab-American Frontiers of Science, Engineering, and Medicine Symposium in Rabat, Morocco. He received his Ph.D. (2007) and M.S. (2003) in Mechanical Engineering from Stanford University, and B.Tech. (2001) in Mechanical Engineering from Indian Institute of Technology, Delhi with top honors.

