

UNDERWRITERS LABORATORIES®

Battery Safety Science Symposium

August 11, 2021

Session III

Empirical and Modeling Studies: New Insights

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Batteries for Electric Aircraft

Battery electric vehicles, powered by renewable energy sources offer a promising path to sustainable mobility. I will compare and contrast the performance metrics needed of batteries for electric land and air vehicles. Major investments are being made in urban air mobility (UAM), which use electric vertical take-off and landing (eVTOL) aircraft that require substantial but achievable battery performance improvements. I will discuss two approaches to achieve the required improvements: (i) increasing the battery specific energy using lithium metal anodes enabled through a new density-driven dendrite suppression mechanism and realized with a soft polymer-ceramic composite separator, (ii) utilizing more of the battery's available energy through improved performance and degradation predictions using scientific machine learning that combines neural ordinary differential equations in a physics-based battery model. I will conclude by discussing about safety considerations related to batteries for electric aircraft.

About the speaker

Dr. Venkat Viswanathan is an Associate Professor of Mechanical Engineering at Carnegie Mellon University. He received his PhD at Stanford University in 2013 and subsequently spent a year as a postdoctoral researcher at MIT. At Carnegie Mellon, he leads an interdisciplinary group comprising of ~30 researchers working on technologies that can accelerate the transition to sustainable transportation and aviation. He is a recipient of numerous awards including the Office of Naval Research (ONR) Young Investigator Award, Alfred P. Sloan Research Fellowship in Chemistry, National Science Foundation CAREER award and MIT Technology Review Innovators Under 35. He has broad expertise in materials related to Li-ion batteries, next-generation technologies such as solid-state batteries, Li-air batteries. He is also an expert on the topic of synergies between autonomous vehicles and electric vehicles. He has been technical consultant for several startups. More details about his research can be found at: <http://andrew.cmu.edu/~venkatv/>

