

# Recent Advances in Materials and Safety Technologies for Lithium-Ion Batteries



### Suresh Sriramulu

V.P. and Executive Director  
TIAX LLC

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Lecture: 4:00-5:00 p.m.

BAGLEY 154

Reception at 3:15 p.m. – Benson Lobby

### Abstract

Lithium-ion batteries have the highest energy density among rechargeable batteries making them attractive for diverse applications such as consumer electronics (e.g., cell phones and tablets), vehicles (e.g., plug-in hybrid electric vehicles), energy storage systems (e.g., load leveling), military systems (e.g., silent watch vehicles), etc. The ever increasing demand for smaller and lighter (i.e., higher energy density) batteries is driving materials research today. Even as Li-ion technology is being considered for emerging applications such as energy storage systems, recent high profile safety incidents involving Li-ion batteries highlight the need for new approaches to ensure the safety of these batteries.

This presentation will provide an overview of recent developments, current challenges and opportunities in lithium-ion battery materials and safety technologies. Our group has developed an advanced cathode material, CAM-7, that can be produced at multi-ton levels in our pilot plant. Using examples from the implementation of this material in high-performance cells, we will present surprising insights into the factors that govern the energy and power densities of Li-ion cells.

A framework for guiding the development of Li-ion battery safety technologies will also be presented. Experimental measurements combined with simulations have led to an improved understanding of the primary triggers of thermal runaway in Li-ion cells and safety incidents in the field. High-speed videos of cell failures and simulation results will be used to discuss the initiation and propagation of thermal runaway in cells and packs. Finally, recently developed technologies to enhance battery safety will be highlighted.

### Speaker Biography

Dr. Suresh Sriramulu is the Chief Technology Officer at CAMX Power, where he leads a multidisciplinary team of scientists and engineers developing advanced materials and safety technologies for Li-ion batteries. He is responsible for the overall technology strategy at CAMX Power overseeing early-stage research and development, scaling-up and prototyping of promising technologies, their implementation in battery systems, technical marketing to customers and end-users, and the IP strategy. He led the successful development and scale-up of a high-energy density cathode material CAM-7 that is now being commercialized. His team also developed a technology for non-invasive detection of incipient internal short circuits in Li-ion batteries that is being adapted for PHEV batteries. Dr. Sriramulu previously led the Advanced Battery Technology Division at TIAX for more than nine years. Prior to joining TIAX, Dr. Sriramulu was part of the Reaction Engineering Group at Arthur D. Little, Inc., where he was involved in research and development of fuel cell systems and catalytic converters.

Dr. Sriramulu received his Ph.D. in Chemical Engineering from the University of Washington, Seattle, under the supervision of Prof. Eric Stuve. He has an M.S. in Chemical Engineering from the University of Wyoming, Laramie, and a B. Tech in Chemical Engineering from the Indian Institute of Technology, Madras, India.