

Manufacturing of Lithium Ion Batteries for Electric Vehicles: Current Status, Challenges and Outlook

Abstract: Electric vehicles (EVs) fleet is rapidly growing as clean alternatives to conventional vehicles for reducing greenhouse gas emissions from ground transportation. Current EVs are all powered by lithium ion batteries. However, the lithium ion batteries (LIBs) used in current EVs are with limited capacity, short battery life and large environmental impacts, which are rooted in the battery materials, manufacturing processes and operating conditions. In this keynote talk, current manufacturing processes employed for lithium ion batteries are reviewed with challenging factors governing the performance and quality of batteries being identified. Outlook to future of lithium ion battery manufacturing for electric vehicles is presented with some potential technologies to change the battery manufacturing industry in future to make it more sustainable and cost-effective.

Bio:

Chris Yuan currently holds the Leonard Case Jr. Professorship in Department of Mechanical and Aerospace Engineering at Case Western Reserve University. He is the Director of the Laboratory for Sustainable Energy Manufacturing and Director of the DOE-funded Industrial Assessment Center at CWRU. His research activities are focused on the forefront of sustainable manufacturing, industrial energy efficiency and clean energy manufacturing. So far he has published over 180 research papers and book chapters on these topics. His research work has been recognized by many national and international awards. In 2021, he received the Thar Energy Award from the American Society of Mechanical Engineers (ASME). In 2017 his research won First Place in the U.S. RAMP National Research Competition on Sustainable Manufacturing. In 2018, he is the recipient of the American Society of Mechanical Engineers' Chao and Trigger Young Manufacturing Engineer Award. He received the National Science Foundation Career Award in 2014, The Gustav Olling Outstanding Young Manufacturing Engineer Award from the Society of Manufacturing Engineers (SME) in 2013, and the LEO Best Paper Award from the 2013 CIRP International Conference on Life Cycle Engineering. He served the Chair of ASME Life Cycle Engineering Technical Committee during 2013-2015, and served over 50 times as conference program chairs, track chairs, symposium chairs, session chairs, scientific committee, etc., for various ASME, IEEE, and CIRP conferences. He obtained his Ph.D. in Mechanical Engineering from the University of California, Berkeley in 2009. He is a Fellow of American Society of Mechanical Engineers.