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(Invited) Directions of High Energy Batteries and Status of Battery500 Consortium

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Abstract

The success in the development and commercialization of Li-ion batteries has transformed the modern society. Currently there have been intense efforts to further improve battery performances and reduce the cost with many different materials and battery concepts. Based on careful analysis of commercially available advanced electrode materials and state-of-art cell manufacturing processes, we have identified the most feasible pathways for developing high energy batteries with a specific energy much higher than 300 Wh kg⁻¹ using Li metal anode and high capacity metal oxides or sulfur cathode materials. This talk will highlight our analysis, the strategy, and current understanding of the scientific and technological challenges, and discuss recent progresses and directions based on a high-energy cell level design, fabrication, characterization and testing. This talk will also discuss the fundamental mechanisms for premature cell failure, and present recent results for achieving long cycle life.