High Performance Li-S Batteries

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Keywords: Lithium-sulfur Battery, Dendrite Growth, Bilateral Solid Electrolyte Interface

Abstract: The primary objective of this collaborative project is to establish a new "sustainable energy consortium" within the state of SC to enhance its research competitiveness, industrial growth in energy storage and transportation, and train the next-generation workforce. Through this SRP, the team has begun leveraging the unique set of research tools within SC for jointly undertaking "cradle-to-grave" battery research and development through multiple thrusts in advanced materials development to device or component level demonstration. Lithium-sulfur (Li−S) battery is a promising candidate for electrical energy storage due to its ability to reversibly store electrical energy at low cost. However, the dendritic growth (anode) and shuttle effect (cathode) hinder its practical application. We will present a strategy for the development of new electrolytes for Li-S batteries which hold promise for promoting the simultaneous formation of bilateral solid electrolyte interfaces (SEI) on the sulfur-host cathode and lithium anode, leading to an effective suppression of the shuttle effect and dendrite growth. The Li-S batteries with the bilateral SEI are expected to deliver high specific capacity and exhibit long term cycling stability with a Coulombic efficiency of ~100% and high capacity retention.