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Review

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A review on anode for lithium-sulfur batteries: Progress and Prospects

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Abstract

Lithium-sulfur battery is regarded as one of the promising next-generation energy storage to electrical and portable devices thanks to its extremely high theoretical capacity, energy density, good environmental protection and low cost. However, the practical application of lithium-sulfur battery is still greatly impeded by the low Coulombic efficiency and the short lifespan, which is mainly attributed to the polysulfide shuttle and the uncontrollable lithium dendrite growth. Suppressing the growth of the lithium dendrite and hindering the notorious reaction between soluble polysulfides and lithium are extremely critical not only to a safe and efficient lithium anode, but also to the high-capacity lithium-sulfur battery. A comprehensive review of various strategies for strengthening the anode stability of lithium-sulfur battery is presented in this paper, including modifying the electrolyte and current collector, employing artificial protection films and finding alternative anodes to replace the lithium anode. The effects of different selections and the resulting properties of the anodes on the overall lithium-sulfur battery performance are discussed. The current research challenges and future perspectives associated with lithium-sulfur battery anode are also discussed.

Keywords: Lithium-sulfur battery; Lithium dendrite; Solid electrolyte interface; Current collector; Compound anodes; Lithium-free anodes

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