Materials used in solid-state lithium-sulfur batteries

Is sulfur a good material for lithium-sulfur batteries?
Sulfur materials Due to its high theoretical specific capacity (1675 mAh g -1) and low cost,elemental sulfur is considered an ideal active material for lithium-sulfur batteries. In particular,the interface between sulfur and sulfide SSEs shows good chemical compatibility in sulfide-based ASSLSBs.

Are all-solid-state lithium-sulfur batteries a good energy storage solution?
All-solid-state lithium-sulfur (Li-S) batteries have emerged as a promising energy storage solutiondue to their potential high energy density,cost effectiveness and safe operation. Gaining a deeper understanding of sulfur redox in the solid state is critical for advancing all-solid-state Li-S battery technology.

Are sulfide-based solid-state lithium-sulfur batteries a good solution for lithium dendrite growth?
The use of sulfide solid electrolytes (SEs) instead of organic liquid electrolytes can completely avoid the shuttle effect and mitigate the lithium dendrite growth problem due to the rigidity of sulfide SEs, but this does not mean that sulfide-based solid-state lithium-sulfur batteries (SSLSBs) are the optimal solution.

What is a liquid lithium-sulfur battery?
In conventional liquid lithium-sulfur batteries, the sulfur electrode undergoes a "solid-liquid-solid" reaction.

What is a solid-state lithium-sulfur battery?
X. Tao, Y. Liu, W. Liu, G. Zhou, J. Zhao et al., Solid-state lithium-sulfur batteries operated at 37 °C with composites of nanostructured Li 7 La 3 Zr 2 O 12 /carbon foam and polymer.

Can a lithium-sulfur battery be electrically conductive?
A team led by engineers at the University of California San Diego developed a new cathode material for solid-state lithium-sulfur batteries that is electrically conductive and structurally healable--features that overcome the limitations of these batteries' current cathodes. The work was recently published in the journal Nature.

Herein, a summary is presented of emerging COF materials in addressing the challenging problems in terms of sulfur hosts, modified separators, artificial solid electrolyte interphase layers, and solid-state electrolytes. This comprehensive ...

Secondary batteries with high energy density, high specific energy and long cycle life have attracted increasing research attention as required for ground and aerial electric vehicles and large-scale stationary energy-storage.Lithium-sulfur (Li-S) batteries are considered as a particularly promising candidate because of their high theoretical performance and low ...

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With the rapid development of research into flexible electronics and wearable electronics in recent years, there has been an increasing demand for flexible power ...

In recent years, several reviews have been reported on lithium-sulfur batteries (LSB). However, these reviews only dealt with limited focus areas of the LSB, viz: (i) specific materials such as the functional binders [2], biomass materials [3], [4], anode materials [5], electrospun nanofiber materials [6], cellulose-based materials [7], electronically conducting ...

In particular, all-solid-state lithium-sulfur batteries (ASSLSBs) that rely on lithium-sulfur reversible redox processes exhibit immense potential as an energy storage ...

Herein, a summary is presented of emerging COF materials in addressing the challenging problems in terms of sulfur hosts, modified separators, artificial solid electrolyte interphase layers, and solid-state electrolytes. This ...

It has the advantages of high efficiency and customization and is suitable for various solid-state batteries and energy storage devices. The solid-state reaction method is a widely established and frequently used technique for synthesizing sulfide SEs. However, several challenges are inherent to this approach.

Lithium-sulfur all-solid-state battery (Li-S ASSB) technology has attracted attention as a safe, high-specific-energy (theoretically 2600 Wh kg -1), durable, and low-cost ...

First, it is a critical raw chemical for synthesizing sulfide-based solid electrolytes (such as Li 9.54 Si 1.74 P 1.44 S 11.7 Cl 0.3 [4] and 70 (0.75Li 2 S·0.25P 2 S 5)-30LiI [12]) for all-solid-state lithium batteries [13]. Second, it can be used as the active cathode material in lithium-sulfur (Li-S) batteries [6], which are widely ...

et al. Sulfur/reduced graphite oxide and dual-anion solid polymer-electrolyte integrated structure for high-loading practical all-solid-state lithium-sulfur batteries.

A solid-state polymer electrolyte (SPE) could be a viable alternative in order to reduce polysulfide mobility and to mitigate the shuttle effect in lithium-sulfur batteries. In this work, single lithium-ion conducting solid ...

Sulfide-based all-solid-state lithium-sulfur batteries (ASSLSBs) have recently attracted great attention. The "shuttle effect" caused by the migration of polysulfides in conventional liquid lithium-sulfur batteries could be eliminated. ... (1675 mAh g -1) and low cost, elemental sulfur is considered an ideal active material for lithium ...

A team led by engineers at the University of California San Diego developed a new cathode material for solid-state lithium-sulfur batteries that is electrically conductive and ...

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Lithium-sulfur (Li-S) all-solid-state batteries (ASSBs) hold great promise for next-generation safe, durable and energy-dense battery technology. However, solid-state sulfur conversion ...

As the core part of a solid-state lithium-sulfur battery, the solid electrolyte dramatically affects battery performance. A good SSE must have the following characteristics: (1) A high ion mobility number is required, and when the ion mobility number is low, the cell will have severe local polarization, resulting in uneven Li + deposition and lithium dendrite generation [13].

Compared with other secondary batteries, lithium-sulfur batteries (LSBs) have unparalleled advantages such as high energy density, low cost, etc. In liquid LSB systems, it is extremely easy to cause severe "shuttle effect" and safety issues. Hence, the development of solid-state LSBs (SSLSBs) has been attracting much more attention.

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