

Preparation of positive electrode materials for solid-state batteries

Are polymer electrolytes suitable for solid-state lithium battery applications?

The update of the development of solid polymer electrolytes for solid-state lithium battery applications. The synthesis of single-ion-conducting polymer electrolytes based on fixed group anions and the structural design of lithium salts centered on extended delocalization.

How to prepare composite electrodes using a sulfide solution?

In preparation of the composite electrodes via the solution process (Figure 1 b), the NMC and carbon were dispersed in the sulfide SE solution and mixed using a vortex mixer at 2800 rpm (AS ONE test tube shakers, Japan); this last step was used to make the slurry homogeneous. Then, the slurry was heated at 150 °C under a vacuum to remove solvents.

How can composite electrodes improve the electrochemical performance of the ASSB?

On the other hand, the preparation of composite electrodes with more intimate contacts between active materials and sulfide SEs is also crucial to achieving low interfacial resistance and, therefore, to enhancing the electrochemical performance of the ASSB.

What is a composite electrode?

The composite electrodes consist of lithium-silicate-coated $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ (NMC), a sulfide SE, and carbon additives. The charge-transfer resistance at the interface of the solid electrolyte and NMC is the main parameter related to the ASSB's status. This value decreases when the composite electrodes are prepared via a solution process.

What is solid-state reaction method for preparing sulfide electrolytes?

In conclusion, the solid-state reaction method for preparing sulfide electrolytes is a reliable, economical, and flexible technology. It has the advantages of high efficiency and customization and is suitable for various solid-state batteries and energy storage devices.

How to prepare carbon electrodes?

For the preparation of carbon electrodes, 50 wt% of unmodified Ketjen or grafted-Ketjen-acid powders were mixed with 50 wt% of PVDF binder in n-methyl-2-pyrrolidone (NMP) solvent. The solution was mixed with a Thinky mixer until a homogeneous solution was obtained with an appropriate viscosity for coating.

A lithium-excess vanadium oxide, $\text{Li}_{8/7}\text{Ti}_2\text{V}_4\text{O}_2$, with a cation-disordered structure is synthesized and proposed as potential high-capacity, high-power, long-life, and safe positive electrode materials. $\text{Li}_{8/7}\text{Ti}_2\text{V}_4\text{O}_2$ delivers a large reversible capacity...

The primary advantage of ASSLMBs over conventional liquid batteries is the solid-state electrolytes, which

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significantly enhance battery safety and mitigate the risks of leakage and fire. Additionally, the high mechanical strength of the solid electrolytes (SEs), which suppresses lithium dendrites, allows direct use of the lithium metal anode, which typically has ...

This study reported an effective one-step preparation method of high performance Li₂S-positive and Si-negative composite electrodes for all-solid-state Li₂S-Si ...

Hawley, W.B. and J. Li, Electrode manufacturing for lithium-ion batteries - analysis of current and next generation processing. *Journal of Energy Storage*, 2019, 25, 100862.

The interlaboratory comparability and reproducibility of all-solid-state battery cell cycling performance are poorly understood due to the lack of standardized set-ups and assembly parameters.

In the past four decades, various lithium-containing transition metal oxides have been discovered as positive electrode materials for LIBs. LiCoO₂ is a layered oxide that can electrochemically extract and insert Li-ions for charge compensation of Co³⁺/Co⁴⁺ redox reaction and has been widely used from firstly commercialized LIBs to state-of-the-art ones [1].

In this review, we describe briefly the historical development of aqueous rechargeable lithium batteries, the advantages and challenges associated with the use of aqueous electrolytes in lithium rechargeable battery with an emphasis on the electrochemical performance of various electrode materials. The following materials have been studied as ...

Here, we report an antifluorite-type Li₃CuS₂ as a sulfide positive electrode active material with high electronic conductivity. All-solid-state batteries using Li₃CuS₂ were successfully operated without the addition of conductive additives to the positive

All-solid-state batteries (ASSBs) with adequately selected cathode materials exhibit a higher energy density and better safety than conventional lithium-ion batteries (LIBs). Ni-rich layered ...

(100-x)Li₂S-xAlI₃ (0 < x < 30) positive electrode was prepared by the planetary ball-milling method for application in all-solid-state Li-S batteries. X-Ray diffraction results showed that I in AlI₃ ...

The primary advantage of ASSLMBs over conventional liquid batteries is the solid-state electrolytes, which significantly enhance battery safety and mitigate the risks of ...

Herein, this review is to offer timely update of the development of SPEs for solid-state lithium battery applications. Generally, the fundamental principles, classification, key ...

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Si-negative composite electrodes for all-solid-state Li₂S-Si batteries. The composite electrodes were prepared from active materials, high specific surface area carbon, and the raw SE materials by mechanical milling. The preparation was ...

(100-x)Li₂S-xAlI₃ (0 < x < 30) positive electrode was prepared by the planetary ball-milling method for application in all-solid-state Li-S batteries. X-Ray diffraction results showed that I in AlI₃ dissolved into the Li₂S structure in (100-x)Li₂S-xAlI₃ with x < 5 to form the solid solution.

To enhance the energy density of all-solid-state batteries, polysulfide positive electrodes have a great advantage of their high capacity. In this study, we developed Li_xVS_y ...

Here, we report an antifluorite-type Li₃CuS₂ as a sulfide positive electrode active material with high electronic conductivity. All-solid-state batteries using Li₃CuS₂ were successfully operated without the addition of conductive additives ...

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