Challenges in lithium metal anodes for solid-state batteries

Can lithium metal anodes be integrated in solid-state batteries?
In this Perspective,we highlight recent progress and challenges related to the integration of lithium metal anodes in solid-state batteries. While prior reports have suggested that solid electrolytes may be impermeable to lithium metal,this hypothesis has been disprovenunder a variety of electrolyte compositions and cycling conditions.

Why do lithium anodes have limited electrochemical performance?
The limited electrochemical performances of this strategy possibly result from that no effective SEI formed on the surfaceof lithium anode,which cannot prevent lithium metal from being corroded by electrolyte components.

Are lithium dendrites a good anode material?
The rapid development of electrification has led to an increasing demand for high-energy density batteries in electric devices. Lithium metal has been considered the ideal material for batteries due to its high specific energy,but the growth of lithium dendrites has been a major obstacleto its development as an anode material.

Is lithium metal anode a problem?
After putting so much effort, the research on lithium metal anode has made great progress. It is generally believed that uneven deposition/dissolution, high reactivity of lithium, and uncontrollable volume expansion of lithium lead to a series of problems.

Can shes effect protect a lithium anode?
Due to the lack of effective SEI,the lithium anode cannot be protected well. Therefore,the CEs of lithium metal batteries modified by SHES effect are still far from the satisfactory level. This problem would be resolved if the additive could shield Li +and contribute to the formation of effective SEI simultaneously.

Can anode modification improve the performance of lithium metal batteries?
In all,although the studies on anode modification of lithium metal batteries have made some progress,various strategies have knotty issuesin comprehensively improving the performance of lithium metal batteries. And there is still a big gap between the electrochemical properties of lithium metal battery and practical application.

This review discusses the strategies for improving ionic conductivity of solid electrolytes and their stability with lithium-metal anodes. The critical challenges and future developments of high-performance all-solid-state lithium-metal ...

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