

Ma energy storage low temperature lithium battery

Are lithium-based batteries stable at low temperatures?

Stable operation of rechargeable lithium-based batteries at low temperatures is important for cold-climate applications, but is plagued by dendritic Li plating and unstable solid-electrolyte interphase (SEI). Here, we report on high-performance Li metal batteries under low-temperature and high-rate-charging conditions.

Are rechargeable lithium-based batteries a good energy storage device?

Rechargeable lithium-based batteries have become one of the most important energy storage devices^{1,2}. The batteries function reliably at room temperature but display dramatically reduced energy, power, and cycle life at low temperatures (below -10 °C)^{3,4,5,6,7}, which limit the battery use in cold climates^{8,9}.

Are low-temperature lithium batteries safe for high-latitude applications?

No capacity fading at low temperature demonstrated the reduction of water activity and thus offers a safe and reliable candidate for high-latitude applications. Low-temperature lithium batteries have received tremendous attention from both academia and industry recently.

What is a low-temperature lithium battery?

Low-temperature lithium batteries have received tremendous attention from both academia and industry recently. Electrolyte, an indispensably fundamental component, plays a critical role in achieving high ionic conductivity and fast kinetics of charge transfer of lithium batteries at low temperatures (-70 to 0 °C).

Are unconventional electrolytes good for low-temperature lithium batteries?

Overall, in spite of great achievements in unconventional electrolytes for low-temperature lithium batteries, many challenges and opportunities need to be explored. Finding good low-temperature electrolytes remains a significant challenge.

Are low-temperature rechargeable batteries possible?

Consequently, dendrite-free Li deposition was achieved, Li anodes were cycled in a stable manner over a wide temperature range, from -60 °C to 45 °C, and Li metal battery cells showed long cycle lives at -15 °C with a recharge time of 45 min. Our findings open up a promising avenue in the development of low-temperature rechargeable batteries.

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