

Why are fast-charging lithium batteries important?

Fast-charging lithium batteries have generated significant interest among researchers due to the rapid advancement of electronic devices and vehicles. It is imperative to maintain stable and swift battery charging while preserving acceptable reversible capacity.

What are the challenges for fast charging of lithium ion batteries?

Fig. 1 summarized the multiple challenges for fast charging of lithium ion batteries. For example, the potential degradation of material caused by fast charging, mechanisms limiting charging efficiency at low temperatures. The adverse effects of temperature rise induced by fast charging and intensified temperature gradient on battery performance.

How to improve high-rate charging of lithium-ion batteries?

Analysis of typical strategies for rate capability improvement in electrolyte. In conclusion, the applications of low-viscosity co-solvents, high-concentration electrolytes, and additives that can obtain desirable SEI properties for fast charging are effective strategies to improve the high-rate charging of lithium-ion batteries.

Can a porous current collector solve fast-charging and energy-dense lithium-ion batteries?

Realizing fast-charging and energy-dense lithium-ion batteries remains a challenge. Now, a porous current collector has been conceptualized that halves the effective lithium-ion diffusion distance and quadruples the diffusion-limited rate capability of batteries to achieve fast charging without compromising the energy density.

How to fast charge Li-ion batteries?

A significant barrier to the mass adoption of electric vehicles is the long charge time ( $>30$  min) of high-energy Li-ion batteries. Here, the authors propose a practical solution to enable fast charging of commercial Li-ion batteries by combining thermal switching and self-heating.

What is the maximum charge rate of a lithium ion battery?

Although some Li-ion batteries with high power density are optimized for 10C discharge, the maximum charging rate of most commercial Li-ion batteries are limited to 3C. High rate charging induced side reactions, such as lithium plating, mechanical effects and heat generation, which will accelerate the battery degradation.



# Energy storage lithium battery fast charging

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