

What is the future of solid-state battery technology?

The field of solid-state battery technology has witnessed remarkable advancements in recent years. These advancements are driven by intensive research and substantial industry investments. This comprehensive report provides an up-to-date overview of solid-state batteries in 2025.

What is a solid state battery?

In contrast to conventional lithium-ion batteries, which use liquid electrolytes, solid-state batteries use a solid electrolyte material to help ions travel between electrodes. Solid-state batteries naturally offer faster charging due to their superior ion conductivity compared to liquid electrolytes [194, 195, 196].

What is a solid-state battery (SSB)?

A solid-state battery (SSB) is an electrical battery that uses a solid electrolyte (solectro) to conduct ions between the electrodes, instead of the liquid or gel polymer electrolytes found in conventional batteries. Solid-state batteries theoretically offer much higher energy density than the typical lithium-ion or lithium polymer batteries.

What's new in solid-state batteries in 2025?

These advancements are driven by intensive research and substantial industry investments. This comprehensive report provides an up-to-date overview of solid-state batteries in 2025. We will delve into new materials, innovative manufacturing techniques, cutting-edge research, commercialization efforts, and key performance metrics.

Why are solid-state lithium-ion batteries (SSBs) so popular?

The solid-state design of SSBs leads to a reduction in the total weight and volume of the battery, eliminating the need for certain safety features required in liquid electrolyte lithium-ion batteries (LE-LIBs), such as separators and thermal management systems [3,19].

Can solid-state batteries be commercialized?

The global race to commercialize solid-state batteries is intensifying. Major corporations and innovative start-ups are announcing ambitious timelines and showcasing significant prototype achievements. Toyota has strategically positioned solid-state battery technology as a cornerstone of its future electric vehicle (EV) strategy.

This book aims to provide an overview of the developments of emerging materials and their applications in SSBs. This chapter provides a brief introduction of SSBs, from their working principles, advantages over conventional LIBs, to the history ...

Overview History Materials Uses Challenges Advantages Thin-film solid-state batteries Innovation and IP

Solid state battery technology overview

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