

# Research on new lithium batteries

Are lithium-ion batteries the future of battery technology?

Conclusive summary and perspective Lithium-ion batteries are considered to remain the battery technology of choice for the near-to mid-term future and it is anticipated that significant to substantial further improvement is possible.

Why are lithium-ion batteries so popular?

Lithium-ion batteries (LIBs) are widely used in various aspects of human life and production due to their safety, convenience, and low cost, especially in the field of electric vehicles (EVs). Currently, the number of LIBs worldwide is growing exponentially, which also leads to an increase in discarded LIBs.

Should lithium-ion batteries be commercialized?

In fact, compared to other emerging battery technologies, lithium-ion batteries have the great advantage of being commercialized already, allowing for at least a rough estimation of what might be possible at the cell level when reporting the performance of new cell components in lab-scale devices.

Are lithium-ion batteries a good example of joint academic and Industrial Research?

At the same time, they represent a prime example of the successful results of joint academic and industrial research. Lithium-ion batteries are complex, multi-component devices with a long list of inventors, key inventions, and contributions.

How can lithium-based batteries improve cost and performance?

Remarkable improvements to cost and performance in lithium-based batteries owe just as much to innovation at the cell, system and supply chain level as to materials development. Battery development is an interdisciplinary technical area with a complex value chain.

Are 'conventional' lithium-ion batteries approaching the end of their era?

It would be unwise to assume 'conventional' lithium-ion batteries are approaching the end of their era and so we discuss current strategies to improve the current and next generation systems, where a holistic approach will be needed to unlock higher energy density while also maintaining lifetime and safety.

In particular, high-energy density lithium-ion batteries are considered as the ideal power source for electric vehicles (EVs) and hybrid electric vehicles (HEVs) in the automotive industry, in recent years. This ...

Other promising research directions are the use of self-healing binders [[146], [147], [148]], new electrolytes (e.g., with high lithium salt concentrations or new ionic liquids) [149], or new electrolyte additives with higher dipole moment [150]. Also pre-lithiation strategies are a suitable approach to address the remaining challenges, keeping in mind, however, that they ...

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Lithium-ion batteries, known for their superior performance attributes such as fast charging rates and long operational lifespans, are widely utilized in the...

Summarize the recently discovered degradation mechanisms of LIB, laying the foundation for direct regeneration work. Introduce the more environmentally friendly method of ...

In recent years, solid-state lithium batteries (SSLBs) using solid electrolytes (SEs) have been widely recognized as the key next-generation energy storage technology due ...

Researchers from the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) have developed a new lithium metal battery that can be charged and discharged at least 6,000 times -- more than any other pouch battery cell -- and can be ...

Lithium batteries are characterized by high specific energy, high efficiency and long life. These unique properties have made lithium batteries the power sources of choice for the consumer ...

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Lithium-ion batteries are the state-of-the-art electrochemical energy storage technology for mobile electronic devices and electric vehicles. Accordingly, they have attracted a continuously increasing interest in academia and industry, which has led to a steady improvement in energy and power density, while the costs have decreased at even ...

Research into developing new battery technologies in the last century identified alkali metals as potential electrode materials due to their low standard potentials and densities. In particular, lithium is the lightest metal in the periodic table and has the lowest standard potential of all the elements.

Lithium-ion batteries (LIBs), while first commercially developed for portable electronics are now ubiquitous in daily life, in increasingly diverse applications including ...

In recent years, with the vigorous development and gradual deployment of new energy vehicles, more attention has been paid to the research on lithium-ion batteries (LIBs). Compared with the booming LIBs, lithium ...

Solid-state lithium batteries exhibit high-energy density and exceptional safety performance, thereby enabling an extended driving range for electric vehicles in the future. Solid-state electrolytes (SSEs) are the key materials in solid-state batteries that guarantee the safety performance of the battery. This review assesses the research progress on solid-state ...

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Here we present a non-academic view on applied research in lithium-based batteries to sharpen the focus and help bridge the gap between academic and industrial ...

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Lithium-ion batteries (LIBs), while first commercially developed for portable electronics are now ubiquitous in daily life, in increasingly diverse applications including electric cars, power...

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