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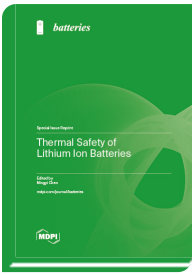
Special Issue Reprint

Thermal Safety of Lithium Ion Batteries



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Lithium-ion batteries (LIBs) are crucial for supporting the large-scale application of energy storage systems, but their inherent thermal instability has become a significant safety concern, especially in high-density battery configurations used in electric vehicles and energy storage stations. Effective thermal management systems are essential for dissipating heat, maintaining an optimal temperature range, and preventing TR. A deep understanding of heat generation, transfer, and dissipation is critical for efficient thermal management and the development of thermal models for LIBs. In the event of TR, the release of gases and flammable materials can cause fires, requiring safety measures such as heat blocking and timely heat dissipation to prevent or delay TRP. Monitoring and early warning technologies, like gas composition monitoring, play a key role in detecting early signs of TR. Fire suppression technologies have also evolved, focusing on optimizing fire extinguishing agents and developing new materials with more efficient and safer fire suppression solutions. Therefore, this Reprint was crafted to update the scientific community on recent advancements and future trajectories in thermal safety, offering valuable insights for improving battery safety and performance. The content of this Reprint spans a spectrum of battery thermal safety advancements, ranging from TR mechanisms, thermal management technologies, risk assessment, TR monitoring methods, TRP Inhibition, and fire extinguishing technology, which will be vital to ensure the safety and reliability of LIBs in high-energy-density applications.

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