



Batteries

an Open Access Journal by MDPI

CiteScore: 6.6

Impact Factor: 4.8

Special Issue Reprint

Lithium-Ion Batteries and Li-Ion Capacitors: From Fundamentals to Practical Applications

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As the representatives of energy and power devices, lithium-ion batteries and lithium-ion capacitors have developed rapidly in recent years. Lithium-ion batteries have in fact become the first choice for new energy vehicles, 3C electronic products, and electrochemical energy storage. Due to their high power densities, energy densities, and long cycle lives, the application of lithium-ion capacitors in automotive energy recovery, electrochemical energy storage and power assistance, fast charging, and high functional devices could be promising. However, there are many problems that remain unsolved regarding the basic research and application of lithium-ion batteries and lithium-ion capacitors. This Reprint focuses on lithium-ion batteries and lithium-ion capacitors, including the increases in the capacities, rates, and lifespans of electrode materials; the increases in ion transmission and storage capacities of anodes and cathodes; and the improvements in the electrode/electrolyte interface and stability of the solid electrolyte interphase. On the other hand, the progress of surface density of electrodes and proportion of active substances have become key issues related to research on lithium-ion batteries and lithium-ion capacitors. Furthermore, pack design, stacking technology, equalization technology, SOC estimation, operation, and monitoring are also crucial to the application of lithium-ion batteries and lithium-ion capacitors as power supply equipment.

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