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A comparative study of lithium-ion and sodium-ion batteries for hybrid electric vehicle

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Abstract:

Lithium-ion batteries (LIBs) and sodium-ion battery-ies (SIBs) are two promising candidates for hybrid electric vehi- cles (HEVs), which require high-performance and low-cost energy storage systems. There are trade-offs between the advantages and disadvantages of these two types of batteries, such as energy density, power density, cost, safety, and environmental impact. In this paper, we review the current state-of-the-art of LIBs and SIBs for HEVs and compare their performance, challenges, and opportunities. We also discuss the potential of hybrid battery packs that combine LIBs and SIBs to achieve synergistic benefits and overcome their respective limitations. SIBs are not yet ready to replace LIBs in HEVs, but they may complement them in some applications, especially in moderate-range and low-temperature scenarios. It recommends further research and innovation to improve the electrochemical properties, materials, and engineering of SIBs, as well as to optimize the design and management of hybrid battery packs.

Keywords:

Hybrid Electric Vehicles, Sodium-ion Batteries, Lithium-ion Batteries