

Perspective

Opportunities for Rechargeable Solid-State Batteries Based on Li-Intercalation Cathodes

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Currently, the lithium-ion battery (LIB) is one of the most viable technologies to enable efficient and clean transportations, which are considered to be crucial for the sustainable development of today's society. However, the energy density of the LIB is approaching its maximum but is still insufficient for meeting the demand of future electric vehicles and other emerging applications. Among all the post LIB chemistries, all solid-state Li metal-intercalation cathode batteries (ASSLICBs) have been capturing attention due to the relatively straightforward cell chemistries compared with Li-S and Li-O₂/air batteries, and the intrinsically enhanced safety with the use of solid electrolytes. In this perspective, in-depth analyses of the attainable energy density, overall safety, and cost for ASSLICBs are presented. The existing approaches from literature toward the claimed energy density and safety are intensively discussed. Possible solutions of the remaining challenges and new directions are also given, aiming at designing practical and high-performance ASSLICBs.