




Polymer Electrolytes for Sodium Batteries

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Abstract

With higher nature abundance and lower production cost of sodium-based materials compared to lithium-based ones, sodium batteries have been arising as one of the most promising energy storage systems serving as complementary power sources to the popular lithium-ion batteries. Replacing conventional liquid electrolytes containing flammable liquid solvents with polymer electrolytes (PEs) empowers sodium batteries with inherently enhanced safety at a low expense of processability. In this contribution, we present a comprehensive overview on the research progresses and advances in the PE-based sodium batteries, including three main categories of PEs, i.e., solid polymer electrolytes (SPEs), composite solid polymer electrolytes (CSPEs), and plasticized/gel polymer electrolytes (PPEs/GPEs). The energy densities of sodium batteries at cell level are estimated and compared with their lithium counterparts. The research development of PE-based sodium batteries is scrutinized and the remaining challenges and possible solutions are intensively discussed. The purpose of the present work is not only to provide a well-balanced status quo of PE-based sodium batteries but also to address the possible remedies for improving their performance and other post lithium battery technologies, in hope of facilitating their large-scale deployment in the market.

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