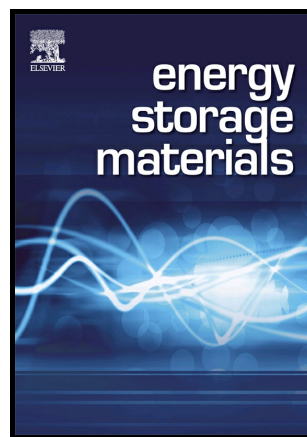


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Mechanisms and properties of ion-transport in inorganic solid electrolytes

ACCEPTED MANUSCRIPT

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Abstract:

Compared with conventional lithium-ion batteries, all-solid-state lithium batteries (ASSLBs) based on inorganic solid electrolytes (ISEs) are relatively new research hotspots, which can overcome tough challenges in conventional lithium-ion batteries, such as potential combustion accidents resulted from flammable liquid electrolyte solvent, low energy density, and fussy manufacturing process. In this review, we focus on the ionic conductivity and stability of ISEs by discussing defect chemistry, ion-doping or elemental substitution, ion-transport mechanism, phase stability, and interfacial stability in representative ISEs (e.g., LISICON-like, NASICON-like, perovskite/anti-perovskite, and garnet electrolytes). The general illustration of structures and fundamental features being important to ionic conductivity or stability are examined, including ion occupancies, ion migration paths and dimensionalities, carrier types, point defects, ion-doping sites, and interfacial structures. Experimental and theoretical studies are discussed in parallel to give a deep and comprehensive understanding on ion transport, ion doping, and stability in ISEs. The common features of Li-ion transport mechanism and several possible research directions are also suggested

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