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Design, fabrication and application of PEO-based solid polymer electrolytes for all-solid-state lithium batteries

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All-solid-state lithium batteries (ASSLBs) have received extensive attention as one of the most promising power sources for flexible and wearable electronics, mainly because of their high flexibility, high energy density and reliable safety. However, the practical application of ASSLBs has been hindered by the poor interfacial stability and inferior ionic conductivity. Therefore, the exploration of advanced solid electrolytes with superior interfacial compatibility/ionic conductivity is an important research topic for all-solid-state batteries. Solid polymer electrolytes (SPEs) exhibit great potential in developing solid-state batteries, specifically for PEO and PEO-based derivatives, because of their superior interfacial compatibility, outstanding solubility against lithium salts, wide electrochemical windows and high ionic conductivity. At the same time, solid fillers, as an important component in SPEs, play a crucial role in determining the overall electrochemical properties. As a consequence, we start from PEO-based materials and prepare SPEs by adding plastic additives and solid fillers with good structure. The electrochemical performance and structural stability of SPEs are elucidated by a combination of electrochemical characterization and morphological structural characterization.

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