

A straightforward fabrication of solid-state lithium secondary batteries based on multi-functional poly(arylene ether sulfone)-g-poly(ethylene glycol) material

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Lithium conductive solid state poly(arylene ether sulfone)-g-poly(ethylene glycol) (PAES-g-PEG) electrolyte was synthesized for the application of both solid state electrolyte membrane and electrode conductive binder. The solid polymer electrolyte prepared from PAES-g-PEG and 1-butyl-1-methylpyrrolidum bis(fluoromethane sulfonyl) ionic liquid illustrated high lithium conductivity. As the PAES-g-PEG with LiTFSI salt exhibited not only such high conductivity but also, it played an important role as a binder for the electrode binder. As the active materials such as LiCoO_2 , $\text{LiNi}_{0.6}\text{Mn}_{0.2}\text{Co}_{0.2}\text{O}_2$ were quite well compatible with PAES-g-PEG binder, the battery cells fabricated via binding the synthesized SPE and cathode layer showed excellent cell performance. This multi-functional PAES-g-PEG material was applied to lithium sulfur battery system, the resulting cell discharge capacity was even higher than 925 mAh g^{-1} at 0.1C with long term cyclic stability (> 50 cycles).