

Lithium-Ion Conductive Polymer Gel Electrolyte Membrane with Graft Copolymer *via* ATRP Method

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The atom transfer radical polymerization (ATRP) is the method used for easiness control the molecular weight with extent halogen group. In this presentation, we describe an ionic conductive nanostructure polymer electrolyte membrane with graft-copolymer synthesized *via* ATRP. The graft copolymer of poly(vinylidene chloride) with methyl methacrylate(PVDC-*g*-PMMA, P*g*P) consist of back bone for enhancing mechanical strength and side chains for imparting ionic conductivity respectably. The two types of lithium salt, LiTFSI and LiClO₄, are introduced for studying the effect of the anion part of salt. A well-defined nanophase-separated structure with good interconnectivity with lithium salt and PMMA at the nanoscale is reported. The P*g*P-LiTFSI showed higher ionic conductivity owing to synergistic effect with good dissociation ability of TFSI⁻ and good hopping property with PMMA chains. Furthermore, the lowest activation energy and an excellent ionic conductivity of P*g*P polymer membrane electrolyte can successfully be achieved.