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Synthesis and Properties of Polymerized Ionic Liquids

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Abstract

Polymerization of ionic liquids results in the formation of ionic polymers, which are called poly(ionic liquid)s or polymerized ionic liquids (PIL). This is a brand new form of ionicity in polymer chains with a broad range of applications, though ionic polymers have a long history with the sub-families of polyelectrolytes and ionomers. Although mobility of ions in ionic liquids has named them as the promising candidates for various applications, their applicability is limited in many practical systems because of not having the advantages of neither liquids nor solids, suffering from both leakage issue and high viscosity. PILs perfectly fit with the practical requirements while having almost all features of ionic liquids. This review summarizes some potential applications of PILs. The architecture of PILs can be easily re-designed by both the polymer backbone and outer ion. Not only by post-polymerization but also by *in situ* ion-exchange, the chemical and mechanical properties of PILs can be tuned. Owing to the high chemical activity and flexible architecture, PILs are the promising candidates for sensors and actuators, electroactive binders, solid and gel electrolytes, non-blocking matrix of nanocomposites, *etc.*

Keywords: Poly(ionic liquid); Polymerized ionic liquid; Ionic liquids; Ionic polymers; Nanoparticles

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