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Investigations of Self-Assembling Block Copolymer/Ionic Liquid Blends

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Block copolymers are ubiquitous materials with a vast range of applications, e.g. in drug delivery, photolithography, chemical sensors, surfactants, and as templates for the production of hard materials. The properties of these materials and hence the range of potential applications arise from the ability to combine an array of chemical functionalities and architectures that can be synthesised using contemporary polymerisation techniques. More recently, the addition of low molecular weight diluents has been shown to modify as well as allow for the control of the microstructures adopted by these systems.

Recent advancements in characterisation methods have opened up the possibility to interrogate these materials at the molecular- and nano-scale and to, therefore, better understand structure-property-performance relationships within them. This work will focus on recent studies by us carried out in part at the Australian Synchrotron (e.g. using high-throughput and grazing-incidence SAXS) on a range of block copolymers/ionic liquid blends in which it is possible to manipulate both the accessible block copolymer phases and the resulting properties of the materials. These studies have provided both insights into physical properties, e.g. scaling properties of the polymers, and practical methods for fabricating microphases such as co-continuous phases.

Keywords

Block Copolymers, Nanostructure, SAXS, Phase Separation, Structure Property Relations

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