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Phase Behavior and Conductivity of Block Copolymers Containing Heterocyclic Diazole-Based Ionic Liquids ONNURI KIM, MOON JEONG PARK, POSTECH — Recently, Ionic liquids(ILs) integrated polymer electrolyte membranes(PEMs) is becoming important ingredients of diverse applications such as high temperature PEM fuel cells. In present study, we explored morphology and conductivity of sulfonated PEMs upon incorporating ILs. Instead of the use of quaternary alkyl-imidazole based ILs, we employed a set of Brönstead heterocyclic diazole-based ILs possessing protic sites in cation of ILs. A wide variety of self-assembled morphologies, i.e, lamellar, hexagonal cylinder, and gyroid, have been uncovered for the IL embedded PEMs depending on kinds of heterocyclic diazoles. It is worthwhile to note that the ring structures and alkyl substituents in diazoles are found out to play important role in determining the morphology upon manipulating the Flory-Huggins interaction parameters of block copolymers. Heating of ILs-containing PEMs results in thermo-reversible phase transitions. This leads us to investigate the morphology effects of ILs incorporated PEMs on conductivities where the data demonstrate that gyroid morphology is certainly beneficial in obtaining enhanced conductivity values. Our results showed that both molecular design of ILs and structural optimization are crucial for the achievement of the utmost ionic transport properties

Onnuri Kim
POSTECH

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