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Morphology and Proton Conductivity of Ionic Liquid Containing Sulfonated Block Copolymers SUNG YEON KIM, MOON JEONG PARK, POSTECH — Proton exchange membrane fuel cells (PEMFC) offer the prospect of supplying clean electrical power for a wide variety of systems such as portable electronic devices and vehicles. Although, significant effort has been devoted to improvement of the transport properties of PEMs which is operated relatively lower temperature below 80°C, it suffers from a CO poisoning at Pt catalysis, complexity of water and heat management in the system. Herein, we report unique block copolymer electrolyte membrane systems containing ionic liquid. Due to the nonvolatile property of ionic liquid the systems exhibit effective proton transport above 100°C without humidification. In present study, sulfonated block copolymers, i.e., poly(styrenesulfonate-b-methylbuthylene) (SnMBm), are utilized for matrix materials by varying the ion contents and molecular weight. Imidazolium based ionic liquids are selectively incorporated into polystyrenesulfonate phases, which results in various morphological transitions as a function of the amount of the ionic liquid. The effect of counter ions on the observed morphologies is significant yielding concurrently different values of conductivity. Small angle x-ray scattering and transmission electron microscopy have been employed to determine various morphologies of the ionic liquid containing sulfonated block copolymer membranes and impedance spectroscopy is used for the conductivity measurements.

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