A highly ion conductivity, ultrathin, uniform polymeric membrane via liquid plasma-induced polymerization

트란꺽시, 최호석†
충남대학교
(hchoi@cnu.ac.kr†)

In this study, is the first, we report the synthesis of a highly ion conductivity polymeric film using a liquid plasma system under an atmospheric pressure at the surface of ionic liquid, which named gas-liquid interfacial plasma polymerization. The 1-butyl-3-methylimidazolium tetrafluoroborate ([BMI]BF4) and Triton X-100 were used as monomers. At the interface of plasma and the ionic liquid, polymerization is induced by radicals rather than ions. These radical monomers, which react to form cross linking polymer films, are generated at a gas-liquid interfacial plasma through interaction between plasma species with a homogenous solution of [BMI]BF4 and Triton X-100. The thickness of the polymer film was controlled with different molar ratios of [BMI]BF4 and Triton X-100, and plasma reduction time. The maximum thickness of polymer film was 3.043 μm after 10 min of plasma discharged time with 1.5% of molar ratio of Triton X-100. Furthermore, the application of the synthesized polymer film as an alternative Lithium ion conductive polymer leads to high ionic conductivity of 2.02E-03 S.cm-1