Hydrolytically Durable, Highly Proton Conductive Organic-Inorganic Nanocomposite Membranes Containing Chemical Modifiers

이창현, 황신영, 박호범, 김주영[1], 이영무*
한양대학교 화학공학과; [1]삼척대학교
(ymlee@hanyang.ac.kr*)

Organic-inorganic composite membranes show excellent thermal, mechanical, and chemical stability, and high proton conductivity under elevated temperatures and/or low humidified condition. However, there still exist severe problems such as limitation in the incorporation content and difficulty in the homogeneous distribution of inorganic fillers. In this study, sulfonated polyimide-silica nanocomposite membranes were fabricated using fumed silica and non-ionic chemical modifiers to improve membrane stability and to increase water retention level at the elevated temperature. The low-molecular non-ionic modifiers substantially contributed to the improvement of other membrane performances as well as homogeneous distribution of silica particles. Eventually, the ultimate goal of this study is to investigate the effect of hydrophilic and hydrophobic fumed silica in a nanoscale. Another goal is to study the influence of non-ionic chemical modifiers containing hydrophilic-hydrophobic blocks with different chain lengths on the proton conductivity, methanol permeability, and hydrolytic stability.