

Fabrication of Composite Membrane Consisting of Triblock Copolymer Doped with Heteropolyacid for PEMFC

최진규, 이도경, 김용우, 김종학*
연세대학교 화학공학과
(jonghak@yonsei.ac.kr*)

The hybrid organic/inorganic composite polymer electrolyte membranes consisting of triblock copolymer (tBC) and heteropolyacid (HPA) with different HPA contents were prepared and investigated. FT-IR band shifts suggest that the HPA particles strongly interact with both the sulfonic acid groups and the hydroxyl groups in the copolymer. The proton conductivity increased from 0.048 to 0.065 S/cm at room temperature up to 0.2 weight fraction of HPA, due to both the intrinsic conductivity of the HPA particles and the enhanced acidity of the sulfonic acid of the tBC. The water uptake of the composite membranes decreased from 130% to 48% with an increase of HPA contents up to 0.4 of weight fraction of HPA, resulting from the decrease in number of water absorption sites due to hydrogen bonding interaction between the HPA particles and the tBC matrix. SEM pictures also showed that the HPA particles were uniformly distributed throughout the tBC matrix up to 0.4 of weight fraction of HPA. Thermal stabilities of the composite membranes (decomposition temperature > 400 °C) were enhanced, because of strong specific interaction of HPA particles with the sulfonic acid or the hydroxyl groups.