Preparation and characterization of crosslinked proton conducting membranes based on chitosan and PSSA-MA copolymer

박정태[1,2], 서진아[1,2], 증효뢰[1,2], 연승현[1,2], 김종학[1,2,*]
[1]연세대학교 화공생명공학과; [2]수소·연료전지특성화사업단
(jonghak@yonsei.ac.kr*)

Proton conducting crosslinked complex membranes were prepared by blending of a cationic polyelectrolyte, i.e. chitosan (CS) and an anionic polyelectrolyte, i.e. poly(4-styrenesulfonic acid-co-maleic acid) (PSSA-MA). In particular, the dual function of PSSA-MA as a crosslinker and a proton conductor is described. The esterification reaction between –OH of CS and –COOH of PSSA-MA and the complex formation of $NH3^+$ of CS and $SO3^-$ of PSSA-MA were confirmed using FT-IR spectroscopy. The ion exchange capacity (IEC) of membranes continuously increased with PSSA-MA concentrations, resulting from the increase of ionic groups. However, the membranes exhibited the minimum values of proton conductivity and water uptake at 50-67 wt.% of PSSA-MA due to the effect of crosslinking and complex formation. In addition, a maximum of Young's modulus was achieved at 50 wt.% of PSSA-MA, as revealed by universal testing machine (UTM). Thermo gravimetric analysis (TGA) showed that the thermal stability of membranes increased with increasing PSSA-MA concentrations and was the highest at 50 wt.% of PSSA-MA.