Synthesis and Characterization of Crosslinked proton conducting membrane based on block copolymer

지원석, 고종관, 안성훈, 변수진, 김종학*
연세대학교
(jonghak@yonsei.ac.kr*)

This work has demonstrated that polymer electrolyte membranes with controlled, crosslinked structure were prepared using SBS triblock copolymer and SEM monomer with sulfonic acid groups. SBS membranes were thermally crosslinked with SEM in the presence of a thermal-initiator, 4,4'-azobis(4-cyanovaleric acid) (ACVA), as confirmed by FT-IR spectroscopy. As expected, the IEC values and water uptake of SBS/SEMA membranes were increased in proportion to SEM content in the membranes. However, the proton conductivity of membranes increased linearly up to 33 wt% of SEM, above which it abruptly jumped to 0.04 S/cm presumably due to the formation of well-developed proton channels. Microphase-separated morphology and amorphous structures of crosslinked SBS/SEM membranes were observed using wide angle X-ray scattering (WAXS), small angle X-ray scattering (SAXS), and transmission electron microscopy (TEM). The characterization of crosslinked SBS/SEM membranes by TGA demonstrated their high thermal stability up to 250 oC. In addition, these membranes exhibited good mechanical properties, as determined by UTM.