

Amphiphilic poly(vinylidene fluoride-co-chlorotrifluoroethylene)-g-poly(styrene sulfonic acid) graft polymer electrolytes: preparation, characterization and applications to Fuel Cells

고종관, 변수진, 연승현, 서진아, 김종학*
연세대학교 화공생명공학과
(jonghak@yonsei.ac.kr*)

A graft amphiphilic copolymer P(VDF-co-CTFE)-g-PSSA with 47 wt% of PSSA was synthesized via atom transfer radical polymerization (ATRP). This copolymer was combined with titanium isopropoxide (TTIP) to produce graft copolymer/TiO₂ nanocomposite membranes via sol-gel reaction. TiO₂ precursor (TTIP) was selectively incorporated into the hydrophilic PSSA domains of the graft copolymer and grown to form TiO₂ nanoparticles, as confirmed by FT-IR and UV-visible spectroscopy. Water uptake and ion exchange capacity (IEC) decreased with TTIP contents due to the decrease in number of sulfonic acid in the membranes. The proton conductivity decreased with increasing TTIP concentration. However, the proton conductivity of membranes was not significantly decreased upon the addition of 5 wt% of TTIP, at which the mechanical properties of membranes were the greatest. The mechanical properties of membranes increased while maintaining the proton conductivity of 0.021S/cm at room temperature.