

Proton conducting copolymers on the basis of P(VDF-co-CTFE)-g-PSSA Graft Copolymer and TiO₂-PSSA Nanoparticles

박정태, 고주환, 노동규, 고종관, 김종학*
연세대학교 화공생명공학과
(jonghak@yonsei.ac.kr*)

Bifunctional TiO₂ nanoparticles with hygroscopic & proton-conductive properties were synthesized by grafting proton conducting polymer. Poly(styrene sulfonic acid) from TiO₂ nanoparticles via surface-initiated ATRP. Bifunctional TiO₂-PSSA nanoparticles were blended with poly(vinylidene fluoride-co-chlorotrifluoroethylene)-graft-poly(styrene sulfonic acid). P(VDF-co-CTFE)-g-PSSA to give proton conducting membranes for high temperature fuel cells. FT-IR, UV-vis, XRD results revealed bifunctional properties of TiO₂-PSSA nanoparticles due to grafting of PSSA chains. IEC of P(VDF-co-CTFE)-g-PSSA/TiO₂-PSSA membranes was not changed irrespective of TiO₂-PSSA concentrations, representing fixed SO₃⁻ con. in the membranes. Water uptake, proton conductivity of membranes continuously increased with increasing TiO₂-PSSA concentrations, due to hygroscopic, soft conducting property of nanoparticles. TGA showed all the membranes were stable at least up to 280 °C. This work was supported by the Korea Science and Engineering Foundation(KOSEF) grant funded by the Korea government(MEST) (No. R01-2008-000-10112-0)