Ion Conductiviting Properties of Silver Polymer Electrolytes Comprising Microphase-separated Graft Copolymer

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

Silver polymer electrolytes have been prepared by blending silver salt with poly ((oxyethylene)$_9$ methacrylate)-graft-poly(dimethyl siloxane), POEM-g-PDMS, confining silver salts within the continuous ion conducting POEM domains of microphase-separated graft copolymer. $AgClO_4$ polymer electrolytes exhibit higher ionic conductivities and maximum conductivity at higher silver concentrations than $AgCF_3SO_3$ electrolytes. Upon the addition of salt in graft copolymer, the increase of Tg in $AgClO_4$ is higher than that in $AgCF_3SO_3$ electrolytes. Analysis of extended configuration entropy model reveals that the interaction of ether oxygen/$AgClO_4$ is stronger than that of ether oxygen/$AgCF_3SO_3$ whereas the interaction of Ag^+/ClO_4^- is weaker than that of $Ag^+/CF_3SO_3^-$. It is attributed to the fact that silver salts are spatially, selectively incorporated in conducting POEM domains as free ions up to critical concentrations, after which they are distributed in both domains as ion pairs without selectivity. The increase of domain d-spacing in $AgClO_4$ electrolytes is larger than $AgCF_3SO_3$, which again results from high concentrations of free ions in the former.