

Effect of Oligomer Electrolytes on Dye-Sensitized Solar Cells

연승현, 안성훈, 증효퇴, Patel Rajkumar, 고주환, 김종학*
연세대학교 화공생명공학과
(jonghak@yonsei.ac.kr*)

We reports that the effect of oligomers ($M_n = 400\sim 500$ g/mol) were used as polymer electrolytes on DSSC consisting of poly(epichlorohydrin-co-ethylene oxide) (Epichlomer), LiI, 1-methyl-3-propylimidazolium iodide (MPII) and I₂ is investigated. Five kinds of oligomer, i.e. poly(ethylene glycol) (PEG, $M_n = 400$ and 1,000 g/mol), poly(ethylene glycol) dimethyl ether (PEGDME), poly(propylene glycol) (PPG) and poly(ethylene glycol) diglycidyl ether (PEGDGE) were introduced to explain the role of terminal groups and chain length. The improved interfacial contact between the electrolytes and the electrodes by the oligomer addition was confirmed using Scanning Electron Microscope (SEM). The coordinative interactions and structures of polymer electrolytes were characterized by FT-IR spectroscopy and X-Ray Diffraction (XRD). The electrolytes exhibited the ionic conductivities on the order of 10^{-4} S/cm but PEGDGE electrolyte showed much lower value ($\sim 10^{-8}$ S/cm). As a result, the energy conversion efficiency of DSSC was significantly affected by the oligomer. For example, the DSSC employing PEGDME with methyl terminal groups exhibited 3.95% at 100 mW/cm², which is 200-fold higher than that employing PEGDGE.