

International Conference and Exhibition on Polymer Chemistry

November 14-16, 2016 Atlanta, USA

Hydroxypropyl cellulose based gel polymer electrolyte systems for dye-sensitized solar cell application

M H Khanmirzaei

University of Malaya, Malaysia

Gel polymer electrolytes are investigated for dye-sensitized solar cell (DSSC) applications by other researchers. This work is based on hydroxypropyl cellulose (HPC), sodium iodide (NaI), and 1-methyl-3-propylimidazolium iodide (MPII) and 1-hexyl-3-methylimidazolium iodide (HMII) as imidazolium based ionic liquids (ILs) for gel polymer electrolyte preparation. Ethylene carbonate (EC) and propylene carbonate (PC) as plasticizer, and iodine, I₂ as redox mediator were used. There are three systems in this work. Systems I, II and III follow designations of HPC:EC:PC:xNaI, HPC:EC:PC:NaI:xMPII and HPC:EC:PC:NaI:xHMII, respectively, where x is 20, 40, 60, 80 and 100 wt.% of HPC. The amounts of HPC, EC, PC were kept at 0.5 g, 5.0 g and 5.0 g respectively. In Systems II and III, the amount of NaI was kept at 0.5 g. Gel polymer electrolytes were analyzed with electrochemical impedance spectroscopy (EIS). The highest ionic conductivities of 3.95×10^{-3} , 7.37×10^{-3} and 7.04×10^{-3} S cm⁻¹ were achieved in systems I, II and III, respectively. Temperature-dependence ionic conductivity was studied in this work. Double-layer TiO₂ paste was coated on FTO glass as photoactive electrode. Pt coated FTO glass was used as counter electrode. Photoactive electrode soaked in N719 dye for about 24 hr. The Polymer electrolytes were sandwiched between two anode and cathode electrodes for DSSC fabrication. The J-V characteristics of fabricated dye-sensitized solar cells were analyzed under Sun simulator. In systems I, II and III, the highest energy conversion efficiencies of 3.94, 5.79 and 6.24 % were achieved, respectively.

Biography

M H Khanmirzaei has completed his PhD from University of Malaya. He is a Post-doctoral Research Fellow at the University of Malaya. He has published few Q1 and Q2 papers as first author in reputed journals, has registered 2 patents and reviewed few manuscripts in reputed journals. His research interest is on electrochemical devices especially dye-sensitized solar cells and perovskite solar cells.

mhassan1358@hotmail.com

Notes: