Perovskite solar cells with binary salt based gel polymer electrolyte

ABSTRACT

In this work, gel polymer electrolytes based poly(vinyl alcohol) (PVA) with different concentrations of tetrabutylammonium iodide (TBAI) and lithium iodide (LiI) salts have been prepared. The electrolyte conductivity at room temperature is observed to increase from 4.88 mS cm-1 for electrolyte with 17.02 wt.% PVA– 13.93 wt.% TBAI–0.96 wt.% I2–68.09 wt.% DMF (S1 electrolyte) to 6.47 mS cm-1 for electrolyte with 16.98 wt.% PVA–11.81 wt.% TBAI–2.09 wt.% LiI– 1.21 wt.% I2–67.92 wt.% DMF (S4 electrolyte). The conductivity increases from electrolyte S1 to S4 was attributed to the increase in the concentration of mobile ion. The increase in conductivity beyond the S4 electrolyte concentration is influenced by the mobility and diffusivity of charge carriers. All electrolytes prepared have been used in fabricating of methylammonium lead iodide (MAPbI3) perovskite solar cells. The perovskite solar cell with S4 electrolyte shows the highest power conversion efficiency of 1.75% with open circuit voltage (Voc) of 0.62 V and short circuit current density (Jsc) of 3.97 mA cm-2.

Keyword: Gel polymer electrolyte; Electrical transport properties; Perovskite solar cell; Binary iodide saltac