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Performance improvement of solar dye-sensitized solar cell by ionic liquid electrolyte

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PURPOSE OF THE ABSTRACT

Dye-sensitized solar cell (DSSC) is a device that converts visible and infrared electromagnetic radiation into electricity. Its advantages, which include the wide variety, low cost, pollution-free and easy to manufacture, make it attract much attention. Among the various components of DSSC, electrolytes have a crucial influence on their conversion efficiency and long-term durability. Electrolytes not only promote charge transfer between electrodes, but also regenerate dyes and self-reduction during DSSC operation. Corrosion, volatility and electrical conductivity are the key issues in the electrolyte, and they directly affect the stability of the DSSC.

Ionic liquids (ILs) are green solvents composed of cations and anions. They exist in the fluid state over a wide temperature range and have good properties in every temperature state. The advantages of ILs, such as excellent ionic conductivity, superior solubility, high thermal stability, and high chemical stability, can help to reduce environmental pollution and improve electrolyte conductivity.

In this study, four kinds of ILs were added into DSSC system to effectively inhibit and restrain the leakage of electrolyte. The electrolyte in DSSC was modified by 30 mass% [BMIM][I] and [BMIM][PF₆], which efficiently promoted the power generation efficiency, electrical conductivity, and thermal stability.

FIGURES

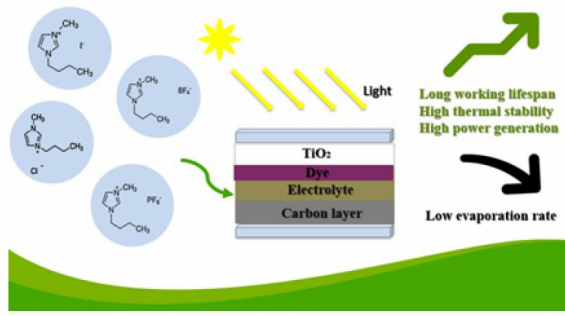


FIGURE 1

isgc
isgc

FIGURE 2

KEYWORDS

Long-term durability | Electrolyte conductivity | Power generation efficiency | Thermal stability

BIBLIOGRAPHY