

Efficient Quasi-Solid Dye Sensitized Solar Cells Employing Molten Salt Electrolyte

G. K. R. Senadeera* and N. de Silva

Institute of Fundamental Studies, Hantana Road, Kandy

Abstract

There have been many attempts to increase the overall conversion efficiency of dye-sensitized solar cells using liquid-state electrolytes. However, this type of cells have unsolved critical problems such as leakage and evaporation of volatile organic solvents. Thus the development of more stable solid or quasi-solid state cell is of great importance. In the study reported here, we developed a novel fabrication method of dye sensitized quasi-solid solar cells using solid composite materials of LiSCN and methyl-hexyl-imidazolium iodide (MHImI) as hole transport materials to replace liquid iodide and polyiodide electrolyte which consists of volatile solvents. The device based on 6 μm thick nanocrystalline TiO_2 film absorbed by monolayer of Ru(II) terpyridyl complex photosensitizer (N719 dye), shows excellent incident photon-to-electron conversion efficiency (IPCE, $\sim 75\%$), large current density (11.6 mA cm^{-2}), and high light-to-electric energy conversion efficiency (5.3- 6.1%) under the illumination of 100 mW cm^{-2} (AM 1.5).
