Fabrication and Characterization of Polymer-Fullerene as Top Layer For CIGS Hybrid Tandem Solar Cells Performance

팜하우텐비엣, 트롱윈탐윈, 트린탄기에우, 박진호*
영남대학교
(chpark@ynu.ac.kr*)

Polymer-fullerene bulk hetero-junction (BHJ) solar cells are a potential low cost alternative to conventional inorganic semiconductor solar cells. Although encouraging progress has been made with power-conversion efficiencies (PCE) of ~ 7%, reported, the limited efficiency has hindered the path toward commercialization.The “tandem cell” architecture, a multilayer structure that is connected two photovoltaic cells in series, offers a number of advantages. The use of two semiconductors with different band gaps enables absorption over a broad range of photon energies within the solar emission spectrum, a wide band-gap semiconductor for the first cell and a smaller band-gap semiconductor for the second cell.The tandem cell architecture can therefore improve the light harvesting in polymer-based photovoltaic cells. This approach can lead to higher efficiency than is possible with a single cell. In this work, we investigated the top cell as polymer-fullerene structure, and bottom cell as CIGS (or Silicon) to fabricate the hybrid tandem solar cells. Device parameters were measured by using a solar simulator (Keithley 69911) under AM 1.5 illumination.