Electrical Simulation for Different Thickness Ratio of PCBM and PTAA in Bilayer Organic Solar Cells

ABSTRACT

In organic solar cells, it is regularly observed that different thickness of active layer result in different competency of the device due to its behaviour of charge transportation and charge collection in such volume morphology of active layer. In this paper, heterojunction device based on poly(triarylamine) (PTAA) and [6,6]-phenyl- C61 –butyric acid methyl ester (PCBM) as active layer had been electrically characterized using general –purpose photovoltaic device model (GPVDM) software. A thickness ratio: 50:50, 100:50,150:50, and 250:50 nm of PTAA to PCBM and vice versa for PCBM to PTAA were evaluated in this simulation. This simulation displays a pattern of current-voltage (I-V) and current density-voltage (J-V) at different thickness for PTAA/PCBM heterojunction bilayer solar cells. The short circuit current density (Jsc), open circuit voltage (Voc) and fill factor (FF) for each different thickness active layer device was also presented as well. The highest achievable efficiency, 9.283 % was observed at thickness ratio of 250: 50 nm (PTAA to PCBM) under light intensity of 10 mW/cm2 .