Comparison of Organic Polymer P3HT Blended with Fullerene Acceptor $PC_{61}BM$ versus Non-Fullerene Acceptor Coi8DFIC

Franklyne Wekesa[1], Dr. Isaac Motochi[2] & Dr. Francis Otieno[3]
[1,2]Department of Mathematics and Physical Sciences, Maasai Mara University
P.O Box 861-20500, Narok, Kenya
Tel: +254 723 150455
Email: franklynewekesa99@gmail.com

Abstract
The Organic Solar Cells (OSCs) based on the bulk hetero-junction (BHJ) structure have been projected to become successful renewable energy alternatives. Studies concerning BHJ OSCs are ongoing because they have a higher potential in championing low-cost, environmental harmless, non-complex and flexible large area devices. In this work we compared the organic polymer P3HT blended with fullerene acceptor $PC_{61}BM$ versus non-fullerene acceptor COi8DFIC in the formation of BHJ. This study compared the performance of polymer donor P3HT blended with fullerene acceptor $PC_{61}BM$ and non-fullerene acceptor COi8DFIC through the use of steady-state absorption and emission spectroscopy where charge generation and separation for different donor: acceptor blend films were studied. The films were then characterized using UV-VIS and photoluminescence spectroscopy for their charge generation and separation. From the UV-VIS spectroscopy results, the polymer blend of the P3HT: COi8DFIC showed an extended absorption window in the UV, VIS and NIR regions compared to P3HT: $PC_{61}BM$ blend. In the PL spectroscopy, there was better quenching of the polymer donor by the COi8DFIC compared to the $PC_{61}BM$ as depicted by their respective polymer blend spectra. The study was able to give a detailed comparison of the effect of the fullerene $PC_{61}BM$ and non-fullerene COi8DFIC acceptors on the polymer donor P3HT.

Key words: Polymer solar cells and bulk hetero-junction.