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Characterization of P3HT-CNT thin films for photovoltaic solar cell application

The global share of photovoltaic (PV) technologies in the electricity and energy production still remain marginal today and is likely to remain this way for a long period of time especially in the poor developing countries [1]. The evidence of the limited global impact of PV is marked by the increasing market share of fossil fuels in the generation of electricity [2]. Carbon nanotubes (CNT) have emerged as one of the leading additives for improving the thermoelectric properties of organic materials due to their unique structure and excellent electronic transport properties [3]. CNT are the most commonly used and effective material among numerous fillers. They can provide conductive paths when embedded in polymer matrix because CNT possess excellent electrical conductivity and high charge mobilities [3]. In this study poly(3 – hexylthiophene) P3HT-CNT at different ratios is investigated for the purpose of improving P3HT absorption and conductivity for applications in organic solar cells. The X-ray diffraction (XRD) results revealed that P3HT-CNT (1:1) is more crystalline and also have the highest intensity in both ultra violet to visible (UV-Vis) spectrophotometer and photoluminescence (PL) spectroscopy. The disordered structure of CNT was observed from the field emission scanning electron microscopy (FESEM). Energy-dispersive spectroscopy (EDS) confirmed the incorporation of P3HT in CNT. Fourier Transform Infrared Spectroscopy (FTIR) confirmed the P3HT and CNT vibration modes and current-voltage (I-V) characterization showed an improvement in conductivity.

Keywords: Carbon nanotube, Ratio, Photoluminescence, Conductivity

Reference

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Yes

Level for award;(Hons, MSc, PhD, N/A)?

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