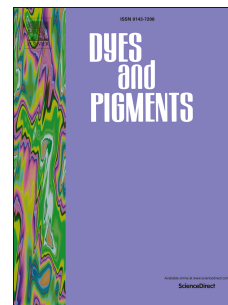


Accepted Manuscript

3-Hexyl-2,5-diphenylthiophene:phenylene vinylene-based conjugated polymer for solar cells application

Umer Mehmood, Muhammad Mansha, Nisar Ullah



PII: S0143-7208(17)30453-9

DOI: [10.1016/j.dyepig.2017.05.043](https://doi.org/10.1016/j.dyepig.2017.05.043)

Reference: DYPI 6005

To appear in: *Dyes and Pigments*

Received Date: 4 March 2017

Revised Date: 23 April 2017

Accepted Date: 22 May 2017

Please cite this article as: Mehmood U, Mansha M, Ullah N, 3-Hexyl-2,5-diphenylthiophene:phenylene vinylene-based conjugated polymer for solar cells application, *Dyes and Pigments* (2017), doi: 10.1016/j.dyepig.2017.05.043.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

3-Hexyl-2,5-diphenylthiophene:phenylene vinylene-based conjugated polymer for solar cells application.

Umer Mehmood,^a Muhammad Mansha,^{b,c} , Nisar Ullah^{c*}

^aCenter of Research Excellence in Renewable Energy, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia

^bCentre of Excellence in Nanotechnology, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia

^cChemistry Department, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia. Tel: + 966 13 8607527. Fax: + 966 13 860 4277. E-mail: nullah@kfupm.edu.sa

Abstract A conjugated polymer, poly(3-hexyl-2,5-diphenylthiophene)-p-bisdodecyloxy-phenylene vinylene) (**CP**) was synthesized whose chemical structure was confirmed by ¹H-NMR and FTIR. **CP** possesses electrochemical band gap of 2.19 eV, determined by cyclic voltammetry (CV), and low lying highest occupied molecular orbital (HOMO) energy level (5.24 eV). Acting as an electron donor, **CP** was mixed with electron acceptor PC₆₁BM in (1:1, w/w) to fabricate the photoactive layer. The resultant **CP**:PC₆₁BM (1:1, w/w) based polymer solar cell (PSC) under AM 1.5G (100 mWcm⁻²) showed power conversion efficiency (PCE) of 2.66% with an open-circuit voltage (V_{OC}) of 678 mV, a short circuit current density (J_{SC}) of 7.711 mA/cm² and a fill factor (FF) of 50%. Band gap of **CP** calculated by Density functional theory (DFT) measurement was determined to 2.04 eV, which was in good agreement with the experimental value obtained by CV.

Keywords Conjugated polymer, photoactive solar cell, open-circuit voltage, density functional theory

Download English Version:

<https://daneshyari.com/en/article/4765848>

Download Persian Version:

<https://daneshyari.com/article/4765848>

[Daneshyari.com](https://daneshyari.com)