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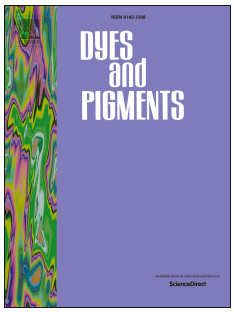

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PII: S0143-7208(16)31323-7

DOI: 10.1016/j.dyepig.2017.02.041

Reference: DYPI 5820

To appear in: *Dyes and Pigments*

Received Date: 1 December 2016

Revised Date: 26 January 2017

Accepted Date: 23 February 2017

Please cite this article as: Siddiqui MN, Mansha M, Mehmood U, Ullah N, Al-Betar AF, Al-Saadi AA, Synthesis and characterization of functionalized polythiophene for polymer-sensitized solar cell, *Dyes and Pigments* (2017), doi: 10.1016/j.dyepig.2017.02.041.

Synthesis and characterization of functionalized polythiophene for polymer-sensitized solar cell

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Abstract

The synthesis of Poly[1,5-naphthyridine-(3-hexylthiophene)] (**1**) semi-conducting polymer has been accomplished by adopting both conventional and microwave-assisted Suzuki-Miyaura cross-coupling reaction between 3-hexylthiophene-2,5-diboronic ester and 2,6-dibromo-1,5-naphthyridine. The synthesized copolymer was characterized by modern spectroscopic techniques including percent reflectance (%R), gel permeation chromatography (GPC), cyclic voltammetry (CV), Raman spectroscopy, thermogravimetric analysis (TGA), FTIR and NMR. The morphology of copolymer was examined via FESEM. Optical bandgap was calculated from the absorption edge of %R and found 2.26 eV. The electrochemical and transport properties of **1** were investigated both in the bulk as well as in thin film form. Cyclic voltammetry (CV) results of **1** as a bulk form in H_2SO_4 solution indicated that the concentration of the polymer in the solution is not well defined because of polymer poor solubility in aqueous solutions. On the other hand, the sulphur group which works as electron donating makes the system more electron-rich. This can be explained by the absence of the reduction peak. For the thin film, two single oxidation peaks were obtained at around 0 V and 0.3 V for both cases. Different solvents can tune the transport properties of the polymer as can be seen from the two CVs where BF_3 exhibited enhanced transport properties over ACN.