STUDY ON CONCENTRATION EFFECT OF MEH-PPV FOR ORGANIC SOLAR CELLS APPLICATION

Final year project submitter in partial fulfilment of the requirement

for the Degree of Bachelor of Electronics (Hons) Engineering

In the Faculty of Electrical Engineering

Universiti Teknologi MARA

(Jan 2014)

HASMIDA BINTI MUDA @ NORUDDIN
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA (UiTM)
40450 SHAH ALAM
MALAYSIA

ACKNOWLEDGEMENT

In the name of Allah, the Beneficent and the Merciful

This is such a humbling experience to be completing this work. I feel blessed and grateful. Lots of new experiences gained from this documentation.

First and foremost, I would like to thank to my supervisor PuanPuteri Sarah MohamadSaad for all support, encouragement, dedication and guidance given throughout the progress of this project. Without her opinions and suggestions, this project would impossible to finish. I also would like to thank the lab technicians, Mr. Suhaimi, Mr.Azwan, Mr.Danial and UiTM for allowing me to use the equipments prepared and the laboratory itself to do this research work.

My appreciation also goes to my family who has been tolerant and supports me all these years. Thanks for their encouragement, love and emotional support that they had given to me. Finally not to be forgotten to all my course mates especially to MohdNazaruddinMamat, MustaenahMudasir,HudaliyanaGhazalibatch and those whom involvedirectly or indirectly with this research. I am truthfully grateful to all of them and their willingness to help.

HasmidabintiMuda @ Noruddin

Faculty of Electrical Engineering

UniversitiTeknologi MARA (UiTM)

Shah Alam

Selangor

ABSTRACT

The concentration effect of Poly[2-methoxy-5-(2′-ethyl-hexyloxy)-1,4-phenylene vinylene] or known as MEH-PPV for organic solar cells application was investigated. MEH-PPV thin film has been prepared on substrates by spin-coating method with different concentration of solutionfrom 10mg/ml to 50mg/mlat room temperature with 2000rpm speed. MEH-PPV powders with different weightwere dissolved in tetrahydrofuran (THF) for 48 hours. The electrical properties were characterized using 2-point probe, while optical properties were obtained using UV-Visible-NIR (UV-VIS-NIR). Besides for surface morphologies of the films were observed using FESEM, and thickness using surface profiler.The UV-vis spectra showed a transmittance peak at 500-600nm. The transmittance peaks reduce from 85T%-20T% as the concentration increased.From the IV measurement the result shows, at thickness 115.56nm gives the highest photoconductivity with value $1.89x10^{-4}(\Omega cm)^{-1}$. The layer of MEH-PPV thin film increased as the concentration of MEH-PPV increases.

Keywords *spin-coating deposition; MEH-PPV; polymer; organic solar cells; thin films*

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1 ORGANIC SOLAR CELL

An organic solar cell (OSC) is a type of polymer solar cell and active components[1] that uses organic electronics, a branch of electronics that deals with conductive organic polymers or small organic molecules, for light absorption and charge transport to produce electricity from sunlight by the photovoltaic effect. An OSC are considered to be a promising candidatefor the next generation solar cells. This is because OSC have light weight,mechanical flexibility, compatibility with roll-to-roll manufacturing,and potentially low cost [2].

Generally, there are three components in an organic solar cell which are the active layer, band alignment layers and the electrodes. The active layer is the most important component that composed of an electron donor and an electron acceptor and is responsible for photon absorption, charge separation and conduction to the electrode. An active layer become famous because of it can provide low operating voltage forlow power nanoscale devices due to easy fabrication processas a very thin layer[3].The band alignment layers are placed between the active layer and the electrodes. Their role is to minimize the band bending that arises from the Schottky barrier between the semiconducting active layer and the metallic electrodes [4].