

ELECTRICAL AND OPTICAL PROPERTIES  
CHARACTERIZATION OF MEH-PPV THIN  
FILM USING SOL-GEL METHOD

ABDUL MUHAIMEN BIN KHAIRUDDIN

FACULTY OF ELECTRICAL ENGINEERING  
UNIVERSITI TEKNOLOGI MARA  
MALAYSIA

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## ABSTRACT

Many LED applications consists of various materials. One of the materials used is polymer. In this study, MEH-PPV known as poly[2-methoxy-5-(2'-ethyl-hexyloxy)-1,4-phenylenevinylene]. Synthesizing the MEH-PPV thin film by sol-gel method and characterization of various properties are the main objectives for this experiment. Synthesizing conducted using spin-coat instrument and anneal using hot furnace. For the characterization of the thin film, electrical and optical properties were the main discussion for this experiment. The material investigated by using Solar Simulator for I-V measurement procedure. Other than that, optical measurements which are absorption and photoluminescence spectra conducted by using Raman PL Dispersive and UV-Vis Spectroscopy. Surface morphology and thickness also conducted using Surface Profiler and Atomic Force Microscopy. Data collected after all the experimental work completed and results shown similar expected measurements for all the characterizations. Moreover, the calculated conductivity was inversely proportional with the thin film thickness. Optical properties shows optimum-level for 3 layer deposition layer thickness sample and quenched as the thickness increased. Besides that, electrical measurements proved symmetrical line occurs for sample at above 3-layer of deposition. Surface morphology indicated that the roughness perpendicular with the surface thickness. All the experimental work conducted according to the proposed procedure and the documented data proved all the expectations and theories related to the objectives.

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## CHAPTER 1

### INTRODUCTION

For the past years, many materials such as silicon (Si), gallium arsenide (GaAs), silicon dioxide have been the conventional material in semiconductors industry. In our modern days, there were several research and breakthrough in 'organic electronics' for the improvement of semiconductor products. This remarkable finding has brought new ideas and makes the researchers developed in mass research and development industry.

Electronic and optoelectronics devices such as light-emitting diodes (LED) and solar cell had been commercialized with usage of conjugated polymers [1]. Conducting polymers kindly consists of a group of compounds and materials with very specific properties[2][3]. There are many similarities in electronic field that caught the attention of many researchers. However, polymers many have thought of its insulators characteristics. As time goes by, many researchers prove that it also can be utilize as a conducting element which is more specifically semiconductors. As the material has most semiconductor characteristics, PPV thin film fabricated for LED's, OLEDs and especially solar cells. According to F.S.S. Zahid, organic solar cells have an exciton diffusion length that is not ideally shorter than the ability to absorb energy or photon makes it easier to bond [4]. This theory implemented into this experiment to optimize the characteristics needed for optoelectronic devices.

Most researchers concluded that MEH-PPV thin film solute with most organic solvents but the optical properties was unexpected and unreliable. The problems occurred overcome by experimented the thin films by varying the thickness by sol-gel method. The objective of this project is to characterize surface morphology, electrical and optical properties MEH-PPV thin film using sol-gel method.