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ELECTRICAL CONDUCTIVITY OF CHLOROPHYLL WITH POLYPYRROLE THIN
FILM ON INDIUM TIN OXIDE AS P-N HETERO-JUNCTION SOLAR CELL

By

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A project report submitted in partial fulfillment of the requirements for the award of the
degree of Bachelor of Science (Electronic Physics and Instrumentation)

DEPARTMENT OF PHYSICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
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PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: ELECTRICAL
CONDUCTIVITY OF CHLOROPHYLL WITH POLYPYRROLE THIN FILM ON
INDIUM TIN OXIDE AS P-N HETEROJUNCTION SOLAR CELL

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DECLARATION

I hereby declare that this thesis entitled Electrical conductivity of Chlorophyll with Polypyrrole thin film on Indium Tin Oxide as p-n hetero-junction solar cell is the result of my own research except as cited in the references.

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ABSTRACT

This study was focused on the electrical conductivity for the combination of polypyrrole thin films and chlorophyll thin films by layered on indium tin oxide (ITO) substrate as p-n hetero-junction solar cell. The polypyrrole thin films was deposited on the ITO substrate by using the Electrochemical Impedance Spectroscopy instrument (EIS) and chlorophyll thin films was deposited on the polypyrrole by using spin coater machine. Chlo + PPY/ITO thin films were prepared with 15 difference thicknesses and each sample was prepared with 3 duplicates. The current and voltage of the thin films were measured by using four point probes under dark and different light intensity. The result of this work showed the polypyrrole thin film successful layered by chlorophyll on the ITO substrate with different thicknesses. The electrical conductivity under dark was measured by using four point probes. Four point probes with pyronometer and data logger was used to measure the electrical conductivity under different intensity of light. The electrical conductivity under dark was increased with the increasing the polypyrrole thicknesses but decreased with increasing chlorophyll thicknesses. The electrical conductivity under light intensity was increased with increasing the light intensity. The electrical conductivity under light was decreased with increasing CHLO and Polypyrrole thicknesses. As a conclusion, the thinnest PPY thin films with thinnest CHLO thin films are suitable combination to increase the electrical conductivity which is 0.152 Sm^{-1} .

ABSTRAK

Fokus kajian ini untuk mengkaji kekonduksian elektrik pada gabungan filem nipis polipirol dan filem nipis klorofil secara berlapisan di atas substrak indium timah oksida (ITO) sebagai p-n simpangan hetero sel solar. Filem nipis polipirol dimendapkan di atas ITO menggunakan kaedah Elektrokimia. Filem nipis klorofil dilapisi di atas polipirol dan ITO dengan menggunakan kaedah penyalut berputar. Filem nipis CHLO+PPY/ITO disediakan dengan 15 ketebalan yang berbeza dan setiap ketebalan dilakukan 3 salinan. Arus dan voltan filem nipis tersebut diukur dengan menggunakan kaedah penduga empat titik di dalam gelap dan di bawah keamatan cahaya yang berbeza-beza. Hasil kajian ini menunjukkan bahawa filem nipis polipirol berjaya dilapisi dengan klorofil di atas substrak ITO dengan ketebalan yang berbeza-beza. Kekonduksian elektrik bagi filem nipis diukur di dalam gelap dengan menggunakan kaedah penduga empat titik. Bagi mengkaji kekonduksian elektrik di bawah cahaya yang berbeza, kaedah penduga empat titik dengan pyronometer dan pengelog data digunakan. Kekonduksian elektrik di dalam gelap menunjukkan peningkatan dengan pertambahan ketebalan polipirol tetapi berkurangan dengan pertambahan ketebalan klorofil. Kekonduksian elektrik dalam keamatan cahaya menunjukkan peningkatan dengan peningkatan keamatan cahaya. Kekonduksian elektrik dalam cahaya menunjukkan kekurangan dengan peningkatan ketebalan polipirol. Kekonduksian elektrik dalam cahaya menunjukkan berkurangan dengan peningkatan cahaya dan peningkatan ketebalan klorofil. Kesimpulan, gabungan yang paling nipis daripada polipirol dengan klorofil yang nipis menghasilkan kekonduksian elektrik yang tinggi iaitu 0.152 Sm^{-1} .