

A STUDY OF THE EFFECTS OF THE NATIONAL  
PROPERTY AND INVESTMENT BOARD  
ON THE ECONOMY

BY  
DR. J. S. K. MURPHY

THE NATIONAL PROPERTY AND INVESTMENT BOARD  
LONDON



**A STUDY OF SURFACE MORPHOLOGY AND PHYSICAL PROPERTIES  
OF POLYMETHYLMETHACRYLATE (PMMA) THIN-FILM.**

By  
Noor Jamsuzazilawati Binti Jamaluddin

A project paper submitted in partial fulfillment of the requirements for the award of  
the degree of Bachelor of Applied Science (Electronics and Instrumentations Physics)

**DEPARTMENT OF PHYSICAL SCIENCES  
FACULTY OF SCIENCE AND TECHNOLOGY  
UNIVERSITI MALAYSIA TERENGGANU  
2008**



JABATAN SAINS FIZIK  
FAKULTI SAINS DAN TEKNOLOGI  
UNIVERSITI MALAYSIA TERENGGANU

## PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: *A Study of Surface Morphology and Physical Properties of Polymethylmethacrylate (PMMA) Thin Film*


oleh *Noor Jamsuzaailawah Jamaluddin*, no. matrik: *UK 12362*

telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Fizik sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah *Sarjana Muda Sains Geometri Teknik (Elektronik dan Instrumentasi)* Fakulti Sains dan Teknologi, UMT.

Disahkan oleh:

  
Penyelia Utama **DR. CHAN KOK SHENG**  
Nama: **DR. CHAN KOK SHENG**  
Cop Rasmi: **Pensyarah**  
**Jabatan Sains Fizik**  
**Fakulti Sains dan Teknologi**  
**Universiti Malaysia Terengganu**  
**21030 Kuala Terengganu**

*5 Mei 2008*  
Tarikh: .....

  
Penyelia Bersama (jika ada)  
Nama: **PROF. DR. SENIN BIN HASSAN**  
Cop Rasmi: **Ketua**  
**Jabatan Sains Fizik**  
**Fakulti Sains dan Teknologi**  
**Universiti Malaysia Terengganu**  
**21030 Kuala Terengganu**


*4 Mei 2008*  
Tarikh: .....

  
Ketua Jabatan Sains Fizik  
Nama: **PROF. DR. SENIN BIN HASSAN**  
Cop Rasmi: **Ketua**  
**Jabatan Sains Fizik**  
**Fakulti Sains dan Teknologi**  
**Universiti Malaysia Terengganu**  
**21030 Kuala Terengganu**

*4 Mei 2008*  
Tarikh: .....

## DECLARATION

I hereby declare that this thesis entitled A Study of Morphology and Physical Properties of Polymethylmethacrylate (PMMA) Thin-film is the result of my own research except as cited in the references.

Signature :  .....

Name : NOOR JAMSUDDILAWATI JAMALUBRIN .....

Matrix No : UK. 12242 .....

Date : 5 / 5 / 08 .....

## ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude to Dr. Chan Kok Sheng, who not served as my supervisor but also, encouraged and challenged me throughout this study. A millionth thanks for always corrected me when I'm doing wrong.

A thousand thanks to all lab assistant who is patiently guided me through this study and help me using the instruments. They cooperation really helps me a lot.

I also wish to thank all my friends for their valuable participation and insights during doing this study.

Last but not least; I wish to thanks my parents and my siblings for their moral support and always encouraged me when I'm down.

## ABSTRACT

The application of polymer especially polymethylmetacrylate (PMMA) has generated much interest in various industry. In this research, characterization and properties of (PMMA) has been studied by several techniques. For the first method measurements reveal the surface morphology of PMMA in a form of powder and thin film. The image of the both PMMA surface has been carried out by Scanning Electron Microscope (SEM). Infrared detector was used to demonstrate the structure of PMMA. The result showed the bond group of PMMA in range between  $500\text{ cm}^{-1}$  and  $4000\text{ cm}^{-1}$ . The hardness of PMMA was analyzed by Affri Hardness Tester. The tensile strength has been studied by Testometric M350-5 CT Tensile Tester. The strength of PMMA thin-film has been compared with the strength of plastic.

## ABSTRAK

Aplikasi penggunaan polimer terutamanya polymethylmethacrylate (PMMA) telah mencetuskan minat dalam pelbagai industri. Kajian ini telah dilakukan bagi mengetahui sifat serta ciri-ciri bagi PMMA dengan menggunakan beberapa kaedah. Kaedah pertama yang digunakan telah mendedahkan morfologi permukaan bagi PMMA dalam bentuk serbuk dan juga filem nipis. Mikroskop Pengimbasan Elektron telah menghasilkan imej permukaan kedua-dua jenis PMMA. Pengesan inframerah telah digunakan bagi menunjukkan struktur PMMA. Keputusan bagi kumpulan ikatan PMMA adalah di dalam skala di antara  $500\text{ cm}^{-1}$  dan  $4000\text{ cm}^{-1}$ . Kekerasan PMMA telah dianalisis menggunakan mesin penguji kekerasan Affri. Mesin penguji ketegangan Testometric M350-5 CT digunakan untuk mengkaji ketegangan PMMA.