

UNIVERSITI TEKNOLOGI MARA

**SYNTHESIS AND
CHARACTERIZATION OF
POLYENE FROM
POLYVINYLCHLORIDE (PVC) AND
ITS COATING PROPERTIES WITH
EPOXIDISED OIL RESIN**

MOHD NURAZZI BIN NORIZAN

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Mohd Nurazzi bin Norizan

Student I.D. No. : 2011630384

Programme : Master of Science

Faculty : Faculty of Applied Sciences

Title : Synthesis and Characterization of Polyene from
Polyvinylchloride (PVC) and Its Coating Properties with
Epoxidised Oil Resin

Signature of Student : 

Date : August 2014

ABSTRACT

Synthesis of polyene for development of conductive coating involves new research area. Hence, this study was aimed to produce the polyene itself from polyvinylchloride (PVC) and disperse into a sustainable oil matrix as coating. Effect of dechlorination of PVC employing different reaction time and conditions were studied. Synthesized polyene formed upon dechlorination process via chemical method was characterized before the polyene powders were dispersed in epoxidised oil (EO) which acts as binder for coating on glass substrate. All polyene powders were then doped with 5% percent of potassium iodide (KI) and the highest value of conductivity was selected to be doped with 10%, 20% and 30% of KI. Thermal characterization via thermal gravimetry analysis and differential scanning calorimetry analysis were also performed to determine the properties of polyene after the dechlorination. For the polyene coated film, conductivity test, UV/Visible and energy band gap determination and wettability study were characterized. Wettability properties of polyene coated layer onto glass slide were determined by performing contact angle test. Based on the elemental analysis by energy-dispersive x-ray spectroscopy (EDS), it is shown that a maximum about 95% of chlorine was eliminated after 2 hours reaction time of dechlorination process. Existence of conjugated bond and effect of doping onto polyene were proven through fourier transform infrared (FTIR) and polyene index. As for polyene powder/ modified EO coated film, sample with 2 hours reaction time showed optimum value of conductivity before and after doped with 5% KI with the value of $1.92 \times 10^{-3} \text{ Scm}^{-1}$ and $3.37 \times 10^{-3} \text{ Scm}^{-1}$ respectively. Hence, in the second stage of analysis, the 2 hours sample was chosen to be doped with 10%, 20% and 30% of KI for analysis of doping effect on conductivity. Based on UV/Vis analysis, the wavelength of maximum absorbance was found to have various absorption peaks due to the different existence of chain conjugation phenomena. UV wavelength absorbance peak values give energy band gap relation and can thus be calculated. Wettability properties of polyene coated layer onto glass slide were also performed to determine the contact angle of film.

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