

**IONIC CONDUCTIVITY STUDIES ON NATURAL RUBBER
GRAFTED WITH 30% (MG30) DOPED LITHIUM
PERCHLORATE (LiClO₄) POLYMER ELECTROLYTES**

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**Final Year Project Report Submitted In Partial Fulfillment Of
The Requirement Of Degree Of Bachelor of Science (Hons.)
Physics in the Faculty of Applied Science University Technology
Mara**

JULY 2013

This Final Year Project Report entitled **“IONIC CONDUCTIVITY STUDIES ON NATURAL RUBBER GRAFTED WITH 30% (MG30) DOPED LITHIUM PERCHLORATE**

(LiClO₄)POLYMER ELECTROLYTES” was submitted by Nur Rashidah Bt Zainudin, in partial fulfillment of the requirement for the Degree of Bachelor of Sciences (Hons.) Physics, in the Faculty of Applied Sciences and was approved by

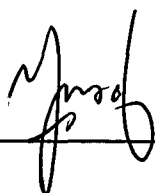


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ACKNOWLEDGEMENTS

Alhamdulillah, I am highly indebted with and praise to allah s.w.t the most merciful and most graceful. Finally my final year project entitled **“Studies On Ionic Conductivity Of Lithium Perchlorate Doped With Modified Natural Rubber (MG30)”** has been successfully done and submitted as planned.

First of all, I would like to express my gratitude for my supervisor, dr. ab malik marwan ali for his guidance and give some advice upon numerous drafts of this final year project. He always give encouragement and ideas in order for me to finish up this final year project.

I also would like to thank to my friend Velarie Jawa for her cooperation and always support me in doing this project. Also thanks to whom that always give me hands and also had shown me the correct ways to performing my task. Lastly my special appreciation is dedicated to my family that gives continuous support, attention and encouragement in doing this final year project. Thank you.

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ABSTRACT

In the present study, 30% PMMA-grafted-natural rubber (MG30), lithium perchlorate (LiClO_4), propylene carbonate (PC) and ethylene carbonate (EC) were used in the preparation of solid polymer electrolytes (SPE) and gel polymer electrolytes (GPE). All samples were prepared by solution cast technique. SPE and GPE were characterized by means of physical and electrical spectroscopy in order to find the suitable polymer electrolytes composition for fabrication in lithium polymer cell. The conductivity of all samples was calculated using the bulk resistance value obtained from the complex impedance plot in the frequency range 100Hz to 1 MHz. The SPE film containing 20 wt.% LiClO_4 in MG30: LiClO_4 exhibit the highest conductivity of $1.865 \times 10^{-8} \text{ S cm}^{-1}$ at room temperature. A further enhancement in the conductivity was obtained on plasticization to form the GPE. The highest room temperature conductivities of $4.12 \times 10^{-4} \text{ S cm}^{-1}$ LiClO_4 :MG30 : PC : EC systems. The increase in conductivity observed in the GPE is due to the increase in the number of mobile ions that is associated with conformational free volume and flexibility of the polymer host upon introduction of plasticizer. The highest GPE for ambient temperature is $2.2 \times 10^{-3} \text{ S cm}^{-1}$. at 70 degree celcius.