

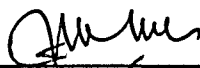
**INVESTIGATIONS ON THE EFFECT OF SiO₂ ON PLASTICIZED
MG30 POLYMER ELECTROLYTES**

SITI NOR HAFIZA BT. MOHD YUSOFF

**Final Year Project Report Submitted in
Partial Fulfillments of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

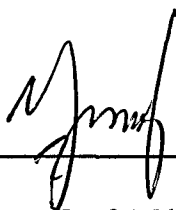
MAY 2010

This Final Year Project Report entitled “Investigations on the Effect of SiO₂ on Plasticized MG30 Polymer Electrolytes” was submitted by Siti Nor Hafiza Bt. Mohd Yusoff, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Physics, in the Faculty of Applied Sciences, and was approved by

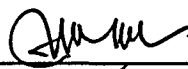


Dr. Ab Malik Marwan Ali
Supervisor
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Assoc. Prof. Dr. Muhd Zu Azhan Yahya
Co-Supervisor
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



Assoc. Prof. Md. Yusuf Theeran
Project Coordinator
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



Dr. Ab Malik Marwan Ali
Head of Programme
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

12 MAY 2010

ACKNOWLEDGEMENTS

Alhamdulillah, I am highly indebted with and praise to Allah S.W.T the most merciful and the most graceful. Finally, my final project entitled **“Investigations on the Effect of SiO₂ on Plasticized MG30 Polymer Electrolytes”** has been successfully done and submitted on time as planned.

Upon completion of this project, I would like to express my gratitude to many parties. My heartfelt thanks goes to my supervisor, Dr. Ab. Malik Marwan Ali for his guidance and advices upon numerous drafts of this final year project. And also to my co-supervisor, Assoc. Prof. Dr. Muhd Zu Azhan Yahya. They always give encouragement and ideals in order for me to finish up this final year project.

I also would like to thanks my partners for her cooperation and for supported me when doing this project from the beginning. Also, thanks to whom that always give me hands when performing my task. Lastly, my special appreciation is dedicated to my beloved family whom gives continuous support, attention and encouragement when doing this final project.

Thank you.

Siti Nor Hafiza Bt. Mohd Yusoff

ABSTRACT

INVESTIGATIONS ON THE EFFECT OF SiO₂ ON PLASTICIZED MG30 POLYMER ELECTROLYTES

The potential of 30% poly(methyl methacrylate) grafted natural rubber (MG30) as a polymer host, zinc chloride (ZnCl₂) as a salt, ethylene carbonate (EC) as a plasticizer and silicon dioxide (SiO₂) as a inorganic filler were prepared to form the flat, thin and flexible films by solution casting technique. The highest conductivity value of solid polymer electrolytes which is MG30 added with salt is 2.389×10^{-5} S/cm with 60 wt.% of SiO₂ at room temperature. The polymer host which is MG30 was added with salt, plasticizer and nanofiller to form composite polymer electrolyte. The ionic conductivity was investigated by using impedance spectroscopy. The highest conductivity of 1.072×10^{-3} S/cm was obtained from 20 wt.% of SiO₂ nanofiller at room temperature.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	
1.1 Background	1
1.2 Problem statements	3
1.3 Objectives of the research	4
1.4 Limitation of research	4
1.5 Scope of work	5
CHAPTER 2 LITERATURE REVIEW	
2.1 Polymer	6
2.2 Polymer electrolytes	6
2.3 Classification of polymer electrolytes	
2.3.1 Solid Polymer electrolytes	8
2.3.2 Gel Polymer electrolytes	10
2.3.3 Composite polymer electrolytes	12
2.4 MG30	13
2.5 Nanofiller	14
2.6 Silicon dioxide	14
2.7 Plasticizer	15
CHAPTER 3 METHODOLOGY	
3.1 Materials	17
3.2 Equipments	17
3.3 Sample preparations	18
3.4 Impedance spectroscopy	20
3.5 Electrical properties	21