INVESTIGATION ON THE EFFECT OF IONIC CONDUCTIVITY OF SiO$_2$ NANOFILLER IN MG30 BASED GEL ELCTROLYTE.

NUR HAMIZAH BT MOHD ZAKI

BACHELOR OF SCIENCE (Hons.) PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITY TEKNOLOGI MARA

MAY 2010

ACKNOWLEDGEMENT

Alhamdulillah, I am highly indebted with and praised to Allah S.W.T the most merciful and the most graceful. Finally my final year project entitled 'Investigation on the Effect of Ionic Conductivity of SiO_2 Nanofiller in MG30 Based Gel Electrolyte' 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 gives some advice upon numerous drafts of this final year project. And also to my co-supervisor which is Assoc. Prof. Dr. Muhd Zu Azhan Yahya. They always give encouragement and ideas in order for me to finish up this final project.

I would to thank to my partners for always support me in finishing 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 who gives continuous support and encouragement. Thank you.

TABLE OF CONTENT

ABSTRACT

INVESTIGATION ON THE EFFECT OF IONIC CONDUCTIVITY OF SiO$_2$ NANOFILLER IN MG30 BASED GEL ELCTROLYTE.

In this research, polymer plays the main role in composite polymer electrolyte (CPE) along with salt and nanofiller. The salt provides ions for conduction and the nanofiller use to enhance the ionic conductivity. Natural rubber grafted with 30% poly (methyl methacrylate) use as a polymer host in composite polymer electrolytes for application in electrochemical devices. The film was prepared by solution cast technique. Impedance spectroscopy technique was carried out in order to determine the electrical conductivity value. The highest conductivity of liquid electrolytes was 2.39×10^{-5} Scm^{-1} at 60 wt% of ZnCl$_2$. The polymer gel electrolyte was prepared by adding plasticizers propylene carbonate (PC). The highest ionic conductivity was 1.41×10^{-3} Scm-1 at sample MG30+ 60 wt% ZnCl$_2$+ PC+ 20 wt% ZnCl$_2$.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, application in many electrochemical devices such as cellular telephones, smart credit cards and etc are main interest in polymer electrolytes. However, their low conductivity makes it limit to use in solid state batteries and electrochromic display devices. So to overcome the problem, plasticizers are added to polymer electrolytes to improve their mechanical and thermal properties. In addition of dispersed second-phase particles is generally used to enhance their conductivity value (Ali et al. 2007).

The study of polymer electrolyte was initiated by Fenton (1973) but was only appreciate later by Armand (1978) when he announced the existence of the material capable of dissolving salt to form a novel class of ionic conductors. Since that, several types of polymer host have been explored and this includes poly (ethylene oxide) (PEO), poly (acrylonitrile) (PAN), poly (methyl methacrylate) (PMMA). The polymer hosts have been used in preparing polymer electrolyte and have been characterized as either solid