

**PREPARATION AND CHARACTERIZATION OF COMPOSITED  
POLYMER ELECTROLYTES FOR ALUMINUM-AIR BATTERY**

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## TABLE OF CONTENTS

ACKNOWLEDGEMENTS	I
TABLE OF CONTENTS	ii
LIST OF TABLES	Iv
LIST OF FIGURE	V
LIST OF ABBREVIATIONS	Vi
ABSTRACT	Vii
ABSTRAK	Viii
CHAPTER 1 INTRODUCTION	
1.1 Background	1
1.2 Problem statement	2
1.3 Objectives	2
1.4 Scope of the Work	3
1.5 The aim of the present work	3
CHAPTER 2 LITERATURE REVIEW	
2.1 Batteries	4
2.2 Air batteries	5
2.3 Aluminum-Air Batteries	6
2.4 Zinc-Air Batteries	6
2.5 Polymer electrolyte	7
2.6 Enhancing the ionic conductivity	7
2.7 Mechanical Properties	10
2.8 Calculation of conductivity	11
2.9 Open Circuit Voltage	12
2.10 Aluminum per Chlorate	12
2.11 Dimethylformamide	12
2.12 Silicon Oxide	13
2.13 Cellulose acetate	13

## CHAPTER 3 METHODOLOGY

3.1 Process flow diagram of experimental method	14
3.2 Preparation of liquid electrolyte between Aluminum per chlorate and Dimethylformamide.	15
3.3 Preparation of polymer electrolyte between aluminum per chlorate, Dimethylformamide and Cellulose Acetate.	16
3.4 Preparation of electrolyte containing Aluminum per chlorate, Dimethylformamide, Cellulose Acetate and Silica.	18
3.5 Preparing Anode and Electrolyte	19
3.6 Cell characterization	20

## CHAPTER 4 RESULTS AND DISCUSSION

4.1 Conductivity	21
4.2 Open Circuit Voltage	26

## CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1 Discussion	30
5.2 Conclusion	31
5.3 Recommendation	31

REFERENCES	32
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BIOGRAPHY	33
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## ABSTRACT

Composite gel polymer electrolyte consist of cellulose acetate (CA), aluminum per chlorate ( $\text{Al}_3\text{ClO}_4$ ), dimethylformamide (DMF) solvent and silicon oxide ( $\text{SiO}_2$ ) filler have been prepared. Liquid electrolyte composing of different molarities  $\text{Al}_3\text{ClO}_4$  in DMF solvent have initially been prepared. The highest conductivity obtained for this system is  $6.11 \times 10^{-3} \text{ Scm}^{-1}$  when the selected 0.9M liquid electrolyte is introduced. Upon the addition of 5wt% of CA as polymeric gelling agent into the selected 0.7M liquid electrolyte, the conductivity is enhanced by  $\sim 21\%$  to the maximum of  $4.85 \times 10^{-3} \text{ Scm}^{-1}$ .  $\text{SiO}_2$  is added into the highest conductivity gel polymer electrolyte system in order to increase the mechanical properties. The highest conductivity obtained for the composited polymer electrolyte is  $6.12 \times 10^{-3} \text{ Scm}^{-1}$  when 3wt%  $\text{SiO}_2$  is added. The highest conducting composited polymer electrolyte sample is then chosen as an electrolyte in fabrication of aluminum air cells. The cells have been characterized according to their open circuit voltage (OCV). It has been found that the initial OCV at 1.65 V is obtained and constant at  $\sim 1.3$  V for more than 24 hours.