

**ION TRANSPORT STUDIES ON PMMA BASED POLYMER
ELECTROLYTES**

**INSTITUT PENYELIDIKAN, PEMBANGUNAN &
PENGKOMERSILAN (IRDC)
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA**

**AB MALIK MARWAN ALI
DR. MUHD ZU AZHAN YAHYA
DR. RI HANUM YAHAYA SUBBAN**

JANUARI 2006



Surat Kami : 600-IRDC/ST 5/3/792

Tarikh : 9 Ogos 2004

Encik Mohd Halil Marsuki
Penolong Akauntan
Unit Kewangan Zon 17
Universiti Teknologi MARA
Shah Alam

Tuan

PERLANTIKAN BAGI MENJALANKAN PENYELIDIKAN

Merujuk kepada perkara di atas, bersama-sama ini dimajukan salinan surat kelulusan menjalankan penyelidikan untuk pensyarah dari Fakulti Sains Gunaan;

1. Ion Transport Studies on PMMA gel-type polymer electrolytes

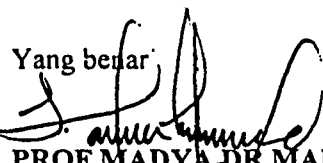
Ketua Projek : En. Ab Malik Marwan bin Ali

Kos Projek : RM 18,000.00

Jenis Geran : Geran Dalaman

Sekian. untuk tindakan pihak tuan selanjutnya.

Terima kasih.

Yang benar,

PROF. MADYA DR MANSUR AHMAD
Ketua Penyelidikan (Sains dan Teknologi)
b/p Penolong Naib Canselor (Penyelidikan)

- s k
1. Dekan
Fakulti Sains Gunaan
 2. Prof Madya Dr. Samirah Abdul Rahman
Timbalan Dekan (Kualiti dan Penyelidikan)
Fakulti Sains Gunaan
 3. En. Ab Malik Marwan bin Ali
Ketua Projek
Fakulti Sains Gunaan



Tarikh : 01 January 2005
No. Projek : 600-IRDC/ST 5/3/792

Y. Bhg Prof. Dr. Azni Zain Ahmed,
Penolong Naib Canselor (Penyelidikan)
Institut Penyelidikan, Pembangunan & Pengkomersilan,
Universiti Teknologi MARA
40450 SHAH ALAM

Y.Bhg Prof,

**LAPORAN AKHIR PENYELIDIKAN “ION TRANSPORT STUDIES ON
PMMA BASED POLYMER ELECTROLYTE”**

Merujuk kepada perkara di atas, bersama-sama ini disertakan 2 (dua) naskah
laporan akhir penyelidikan bertajuk “Ion Transport Studies on PMMA Based Polymer
Electrolyte

Sekian, terima kasih.

Yang benar,



AB MALIK MARWAN ALI
Ketua Projek Penyelidikan

Abstarct

PMMA as the host polymer, lithium Imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$) as the doping salt, ethylene carbonate (EC) and propylene carbonate (PC) as the plasticizers was used in this present investigation. The PMMA salt complexes and plasticized PMMA salt complexes were prepared by solution casting technique. Electrical conductivity of all samples was measured using impedance spectroscopy technique at ambient and elevated temperature (303–383 K). The electrical conductivity of the samples was calculated using bulk resistant value which is obtained from the complex impedance plot in the frequency range from 100 Hz to 5 MHz. The electrical conductivity for pure PMMA is $1.6 \times 10^{-8} \text{ S cm}^{-1}$. The films containing 40 wt.% of $\text{LiN}(\text{CF}_3\text{SO}_2)_2$ exhibits the highest electrical conductivity with the value obtained is $2.3 \times 10^{-6} \text{ Scm}^{-1}$. This value is observed to increase for all samples with plasticizers. The temperature dependence studies show that the samples are ionic conductors and seem to obey the VTF rule. FTIR spectroscopy studies confirmed the polymer salt-interaction.

LIST OF CONTENTS

Acknowledgement	i
Abstract	ii
List of Contents	iii
List of Figures	vi
List of Tables	vii
List of Abbreviations	viii

CHAPTER 1 INTRODUCTION

1.1	Introduction	1
1.2	Objectives	2
1.3	Scope of Works	3
1.4	Aims of Present Work	3

CHAPTER 2 LITERATURE REVIEW

2.1	Introduction	4
2.2	Polymer Electrolytes	4
2.3	Classification of Polymer Electrolytes	5
2.4	Models of Ionic Conduction in Polymer Electrolyte	8
2.5	Criteria of Polymer Electrolytes	10
2.6	PEO based Polymer Electrolytes	11
2.7	PAN-based Polymer Electrolytes	12