

## CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENTS	iii
CONTENTS	iv
LIST OF TABLES	Vii
LIST OF FIGURES	ix
ABSTRACT	Xii
-	
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.0 Background	1
1.1 Why PEO?	6
1.2 PEO Content, Electrical Conductivity and Glass Transition Temperature ( $T_g$ )	8
1.3 What are Polymer Electrolytes?	10
1.4 Multiphase Behavior	11
1.5 Description of Polymer Structure and Mobility	14
1.6 Phase Changes	14
1.7 Mass Transport in Elastomer Phase	15
1.8 Factors which Determine the Conductivity	16
1.8.1 Tortuosity Factor	16
1.8.2 Effective Mobile Ion Concentration	17
1.8.3 Transport Numbers	17
1.9 Conduction Mechanism	18
1.9.1 Some Empirical Relationships:	19
1.9.2 Free Volume Theory and Configurational Entropy Models	23
1.9.3 Dynamic Bond Percolation Model: A Microscopic Theory	24
1.10 Solid State Batteries	25
1.11 Aims of the Present Work	28

---

<b>CHAPTER 2 : EXPERIMENTAL METHODS</b>	<b>31</b>
2.1 Materials and Methods	31
2.1.1 Starting Materials	31
2.1.2 Preparation of Polymer Electrolyte Films	31
2.1.3 Preparation of Composite Cathodes	33
2.1.4 Cell Fabrication	33
2.2 Characterization Techniques	34
2.2.1 UV-Visible Spectroscopy	35
2.2.2 Infrared Spectroscopy	36
2.2.3 Differential Thermal Analysis	37
2.2.4 X-Ray Diffraction	37
2.2.5 Scanning Electron Microscopy	38
2.2.6 Energy Dispersive Analysis of X-rays (EDAX)	40
2.2.7 Impedance Spectroscopy (IS)	41
2.2.8 Cell Characterization and Discharge Characteristics.	44
<b>CHAPTER 3 CHARACTERISTICS OF <math>\text{Ph}_3\text{SnCl}</math> doped PEO films</b>	<b>45</b>
3.1 Introduction	45
3.2 UV - Visible Spectral Analysis	45
3.3 IR - Spectral Analysis	47
3.4 DTA Analysis	50
3.5 XRD Analysis	51
3.6 Impedance Spectroscopy Analysis	56
3.6.1 Room Temperature Dependence of Electrical Conductivity	57
3.6.2 Temperature Dependence of Electrical Conductivity	64
3.7 SEM-EDAX Analysis	66
3.8 Possible Conduction Mechanism	68
3.9 Electrochemical Cell Characterization	70

<b>CHAPTER 4</b>	<b>CHARACTERISTICS OF PEO- DIBUTYLTIN BIS{P-[N-(3,4-DINITRO PHENYL)]AMINO BENZOATE} AND PEO- DIOCTYLTIN BIS{P-[N-(3,4-DINITRO PHENYL)]AMINO BENZOATE}</b>	<b>73</b>
4.1	Introduction	73
4.2	UV - Visible Spectral Analysis	73
4.3	IR - Spectral Analysis	75
4.4	XRD Analysis	78
4.5	Impedance Spectroscopy	80
4.5.1	Room Temperature Dependence of Electrical Conductivity	80
4.5.2	Temperature Dependence of Electrical Conductivity	88
4.6	SEM-EDAX Analysis	92
4.7	Electrochemical Cell Characterization	95
<b>CHAPTER 5</b>	<b>CHARACTERISTICS OF PVC-Ph<sub>3</sub>SnCl</b>	<b>98</b>
5.1	Introduction	98
5.2	XRD Analysis	99
5.3	Impedance Spectroscopy	102
5.4	EDAX Analysis	106
5.5	Electrochemical Cell Characterization	107
	<b>Summary and Conclusions</b>	<b>109</b>
	<b>References</b>	<b>112</b>

PENUNJUTAN HIMPUNAN PENELITIAN  
 DAN PENGABDIAN MASYARAKAT  
 UNIVERSITAS BINA SARASWATI  
 BALIKPAPAN