

**CONDUCTIVITY STUDIES ON THE EFFECT OF COMBINATION
OF DIFFERENT SOLVENT ON LITHIUM BIS (OXALATO)-
BORATE (LiBOB) BASED ELECTROLYTE**

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ABSTRACT

This research focuses on the electrical and structural properties of liquid electrolytes based on lithium bis (oxalato) borate (LiBOB) using different solvent, propylene carbonates (PC) and γ -butyrolactone (γ -BL). Liquid electrolyte was prepared by adding different of range concentration of lithium bis (oxalato) borate (LiBOB) salt into different solvents, PC and γ -BL. All samples were characterized using two techniques, electrical impedance spectroscopy (EIS) for electrical properties and attenuated total reflectance FTIR (ATR-FTIR) spectroscopy for structural properties. The result was found that, the optimum conductivity for 0.4 M LiBOB-PC electrolyte was $2.69 \times 10^{-3} \text{ Scm}^{-1}$ at room temperature and for 0.8M LiBOB- γ -BL was $4.00 \times 10^{-3} \text{ Scm}^{-1}$ at room temperature. By using the PC as a solvent in LiBOB salt is not the good way to evaluate the highest conductivity because the solubility LiBOB in PC is low so the conductivity of LiBOB-PC become decreases, by changing the solvent PC to γ -BL in LiBOB salt can increase the solubility and conductivity dramatically.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Battery is a device consists of electrochemical cell that converts stored chemical energy into electrical energy. There have two types of batteries, primary batteries which are designed to be used once and discarded, and secondary batteries, which are designed to be recharged and used multiple times.

Lithium ion batteries are secondary batteries that can be rechargeable which ions move from the negative electrode to the positive electrode during discharge, and back when charging. Lithium-ion battery have three primary functional components, there are anode, cathode, and electrolyte. The anode of a conventional lithium-ion cell is made from carbon, the cathode is a metal oxide, and the electrolyte is a lithium salt in an organic solvent. The electrolyte is typically a mixture of organic carbonates such as ethylene carbonate or diethyl carbonate containing complexes of lithium ions. These non-aqueous electrolytes generally use non-coordinating anion salts such as LiPF_6 .

Lithium ion batteries also have rapidly dominated the market for power source for portable electronic devices. The characteristics of combining high