# CONDUCTIVITY STUDIES OF MG-30 COMPOSITE POLYMER ELECTROLYTES

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## ABSTRACT

## CONDUCTIVITY STUDIES OF MG-30 COMPOSITE POLYMER ELECTROLYTES

In this study, composite polymer electrolyte comprised of MG-30 polymer host, Zink chloride salt ($ZnCl_2$), propylene carbonate (PC) plasticizer and Aluminium oxide ($Al_2O_3$) filler are prepared using the solution casting technique. Impedance spectroscopy technique was carried out in order to determine the electrical conductivity value. Analysis showed that the higher conductivity was $2.08x10^{-4}$ S/cm is achieve when 20 wt% $Al_2O_3$ is introduced into the system containing 1.0g MG-30 doped with 60 wt% $ZnCl_2$.

# CHAPTER 1

# INTRODUCTION

## 1.1 Background

A polymer is a large molecule (macromolecule) composed of repeating structural units typically connected by covalent chemical bonds. The physical and chemical properties of the polymer depends on the overall size of the polymer chain and on the inter- and intra- molecular forces that hold the polymer together. Basically polymer is insulator or unable to conduct electricity. Ionic conducting is useful in electrochemical devices such as lithium rechargeable batteries, fuel cells and electrochromic devices. Polymers become ionic conductor when inorganic salts are being added in them. In polymer electrolytes system, function of polymer is as an immobile solvent for the ionic salt. The good characteristic of polymer electrolytes are ionic conductors and electrical insulators. Polymer electrolytes can be classified into three groups that are dry polymer electrolytes, gel polymer electrolytes and composite polymer electrolytes. In additional, polymer electrolytes have a many advantages which are easy of preparation, flexibility, no-leakage of electrolyte, higher energy density, flexible geometry, improved safety hazards an enhance high ionic conductivity when adding plasticizer or filler. However, the main drawbacks of these polymer electrolytes are the low ionic conductivity at ambient temperature, poor electrode- electrolyte contact, and high internal resistance for use in electrochemical devices.