EFFECT OF FILLER ON ETHYLENE CARBONATE-PLASTICIZED HEXANOYL CHITOSAN-BASED POLYMER ELECTROLYTES

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TABLE OF CONTENTS

ABSTRACT

Effect of Filler on EC-Plasticized Hexanoyl Chitosan-based Polymer Electrolytes

In this study, composite polymer electrolytes were prepared using solution casting technique. Hexanoyl chitosan, ethylene carbonate, EC, lithium trifluoromethanesulfonate ($LiCF_3SO_3$) and aluminium oxide, Al_2O_3 were used as the polymer host, plasticizer, doping salt and filler, respectively. In order to study the effect of filler, various amount of Al_2O_3 was added ranging from 0.5 wt% to 2.5 wt%. The maximum conductivity achieved is 1.83×10^{-4} Scm^{-1} with addition of 2 wt% Al_2O_3. The temperature dependence conductivity of the sample is Arrhenius in behavior, suggesting that the conductivity is thermally activated. Sample with high conductivity value exhibit high value of dielectric constant is the measurement of stored lithium ions in the sample, thus sample with high value of conductivity could be attributed to the presence of higher number of free ions. FTIR studies suggested that interaction has occurred among components in hexanoyl chitosan-EC-$LiCF_3SO_3$-AL_2O_3 electrolytes system.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Polymer electrolytes are quite unfamiliar term to the common person. But if we are talking about battery, it may give some idea to the listeners about what we are concentrating about. Much kind of batteries has been used earlier and the battery technology was actually started thousands years ago. The age of modern batteries could be considered from the time of Volta. From that time until now, a lot of battery types were produced and the latest one is using lithium polymer technology which was commercially produced.

Although a commercial reality, the lithium polymer technology is still the targeted object of intense world-wide research and developed which aimed to further improve its performance. The areas of interest extend on the three main battery components: anode, cathode and electrolyte with particular attention on the electrolyte material. Ionic conductivity polymer electrolytes which could be utilized for rechargeable lithium polymer batteries have been widely investigated. Although these materials show a lower ionic conductivity than liquid electrolytes, they are less reactive with lithium metal and lithium intercalation compounds.