

AN INVESTIGATION OF THE EFFECTS OF A BLEND
OF POLYETHYLENE TEREPHTHALATE AND
POLYPROPYLENE

BY
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An investigation of PEO/chitosan based blend electrolytes in lithium battery application : type II / Muhamad Faris Mat Tasan.



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**AN INVESTIGATION OF PEO/CHITOSAN BASED BLEND ELECTROLYTES IN
LITHIUM BATTERY APPLICATION: TYPE II**

By

Muhamad Faris B. Mat Tasan

**A project report submitted in partial fulfillment of
the requirement for the award of the degree of
Bachelor of Applied Science (Physics Electronics and Instrumentations)**

**DEPARTMENT OF PHYSICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
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JABATAN SAINS FIZIK
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PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:.....

AN INVESTIGATION OF PEO/CHITOSAN BASED BLEND ELECTROLYTES IN LITHIUM
BATTERY APPLICATION: TYPE II

oleh MUHAMMAD FARIS B. MAT JASAN, no. matrik: UK12499

telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini
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DECLARATION

I hereby declare that this project report entitle An Investigation Of PEO/Chitosan Based Blend Electrolytes In Lithium Battery Applications: Type II is the result of my own research except as cited in the references.

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ABSTRACT

In this work, 2 types of solid polymer electrolyte films containing chitosan/PEO (20:80 w/w) and (80:20 w/w) added with LiCF_3SO_3 as salt varied from 5 to 50wt.% were prepared by solution casting technique. The higher conductivity at room temperature was $1.03 \times 10^{-5} \text{ Scm}^{-1}$ and $7.38 \times 10^{-6} \text{ Scm}^{-1}$ for the sample containing chitosan/PEO (20:80 w/w)/ LiCF_3SO_3 (30 wt.%) and chitosan/PEO (80:20 w/w)/ LiCF_3SO_3 (40 wt.%) respectively. The Fourier Transform Infrared (FTIR) Spectroscopy clearly shows the presence of ionic conductors at 1033 and 1153 cm^{-1} due to the symmetric vibration mode of SO_3 , $\nu_s(\text{SO}_3)$ and asymmetric vibration mode of SO_3 , $\nu_{as}(\text{SO}_3)$. The electrical study was performed in order to investigate the behavior of the polymer electrolyte. The dielectric constant, ϵ_R shows the same behaviors for all of the sample studied. The dielectric constant represents the fractional increase on the stored energy per unit voltage i.e. fractional increase in charge. The dielectric loss, ϵ_I was calculated from impedance and frequency data. Dielectric loss rise sharply at low frequencies indicating that electrode polarization and space charge effects have occurred confirming non-Debye dependence. The real electrical modulus, M_R was calculated. From the real electrical modulus versus frequency plot, it can be observe that there is a long tails exhibited at the lower frequency. The long tail future is be characteristic of a highly capacitive material. In order to prove this material is a Li^+ conductor in a necessary to show the vibration mode of CF_3^- and SO_3^- .

ABSTRAK

Kajian ini, 2 jenis filem elektrolit polimer yang mengandungi citosan/PEO (20:80 b/b) dan (80:20 b/b) ditambah dengan garam LiCF_3SO_3 dari 5wt.% hingga 50 wt.% disediakan melalui kaedah pengeringan. Konduktiviti tertinggi pada suhu bilik adalah pada $1.03 \times 10^{-5} \text{ Scm}^{-1}$ dan $7.38 \times 10^{-6} \text{ Scm}^{-1}$ untuk campuran citosan/PEO (20:80 b/b)/ LiCF_3SO_3 (30wt.%) dan citosan/PEO (80:20 b/b)/ LiCF_3SO_3 (40wt.%). FTIR jelas menunjukkan kehadiran konduktor ionic pada 1033 and 1153 cm^{-1} untuk mod getaran symmetric bagi SO_3 , $\nu_s(\text{SO}_3)$ dan mod getaran asymmetric bagi SO_3 , $\nu_{as}(\text{SO}_3)$. Kajian electrical menunjukkan peringkat penyiasatan terhadap sifat electrolit polimer itu. Pemalar dielektrik, ϵ_R menunjukkan sifat yang sama bagi semua sampel kajian. Pemalar elektrik menunjukkan peningkatan tenaga yang disimpan per unit volt akan menyebabkan peningkatkan jumlah cas. Kihilangan dielectric pula dikira daripada data impedance dan data frekuensi. Graf kehilangan dielektrik lebih tajam pada frekuensi yang rendah menyatakan polarisasi elektrod dan kesan ruang cas menyamai dependen bagi non-Debye. Modulus elektrik juga dihitung. Daripada graf modulus elektrik melawan frekuensi, boleh dibuktikan terdapat ekor yang panjang pada frekuensi yang rendah. Untuk membuktikan bahan ini adalah konduktor ion Li^+ adalah perlu untuk menunjukkan mod getaran bagi ion-ion CF_3^- dan SO_3^- .