

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

THE UNIVERSITY OF CHICAGO PRESS

**AN INVESTIGATION OF CHITOSAN/PEO BASED BLEND
ELECTROLYTES DOPED WITH LiTFSI FOR LITHIUM BATTERY
APPLICATION**

By

Muhamad Azerudi bin Mukhtar

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

**Department of Physical Sciences
Faculty of Sciences and Technology
UNIVERSITI MALAYSIA TERENGGANU**

2008



JABATAN SAINS FIZIK
FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI MALAYSIA TERENGGANU

PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: *An investigation of diethylene/PEO based blend electrolyte doped with LiTFSI for lithium battery application.*

oleh: *Muhammad Aswadi Nurkhatas*, no. matrik: *UK12710*

telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Fizik sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah *S.U.S. Gunaan Fizik (Elektronik & Instrumentasi)* Fakulti Sains dan Teknologi, UMT.

Disahkan oleh:

Nurul Hayati Idris
Penyelia Utama **NURUL HAYATI IDRIS**
Nama: **Pensyarah**
Cop Rasmi: **Jabatan Sains Fizik**
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: *4/5/2008*

Dr. Mohd Ikmar Nizam Bin Mohamad Isa
Penyelia Bersama (jika ada)
Nama: **DR. MOHD IKMAR NIZAM BIN MOHAMAD ISA**
Cop Rasmi: **Pensyarah**
Jabatan Sains Fizik
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: *4/5/2008*

Prof. Dr. Senin Bin Hassan
Ketua Jabatan Sains Fizik
Nama: **PROF. DR. SENIN BIN HASSAN**
Cop Rasmi: **Ketua**
Jabatan Sains Fizik
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: *4/5/2008*

DECLARATION

I hereby declare that this thesis entitled An Investigation of Chitosan/PEO Based Blend Electrolytes Doped With LiTFSI for Lithium Battery Application is the result of my own research except as cited in the references.

Signature : 

Name : Muhamad Azerudi Mukhtar

Matrix No : UK 12710

Date : 4th May 2008

ACKNOWLEDGEMENTS

In the name of Allah, I am very grateful of His allowance for me to finally finish my final year project (PITA) and thesis on the exact time.

First of all, I would like to faithfully express particular thanks to Mdm. Nurul Hayati binti Idris as my supervisor for her non-stop help and support from the beginning until my project is fully accomplished. Only God knows how to repay her contribution for this project to run smoothly. Special thanks also to my co-supervisor, Dr. Ikmar Nizam bin Mohd Isa for his support along my project period. Also to my entire lecturer, thank you very much for their kindness.

Next, thanks to the Department of Physical Sciences, Universiti Malaysia Terengganu especially their staff for all their support. Also to the Department of Physics, Universiti Teknologi MARA, Shah Alam for the allowance and auxiliary during this project.

Finally, never forget to my family for their physical and mental support. Also to my entire friend especially my project partners Syed Mohd Farid, Mohd Faris and Mohd Hasmin for being together finished this project alongside me. For the people that not being mentioned and also help me directly and indirectly, thank you very much for all of you people. I will never forget all your kindness. Thank you very much. I love you all guys.

ABSTRACT

In the present study, the chitosan/PEO at ratio 80:20 w/w containing different LiTFSI concentration have been prepared. The electrical conductivity at room temperature for the highest conducting sample in the system is 5.94×10^{-7} S/cm. The increase in conductivity is due to the increase in the number of mobile ions and the decrease of the conductivity is attributed to ion association and decrease in mobility of the sample. The increase and decrease in the number of ions can be implied from the dielectric constant, ϵ_R vs frequency plot. The values of loss tangent can be obtained by dividing the imaginary and the real part of complex permittivity. Infrared spectroscopy shows complexation between the salt and the chitosan/PEO polymer.

ABSTRAK

Dalam kajian yang dijalankan, kitosan/PEO dalam nisbah 80:20 w/w dan mengandungi kepekatan garam LiTFSI yang berbeza telah disediakan dan dianalisis. Hasilnya, nilai konduktiviti tertinggi yang diperolehi pada suhu bilik ialah 5.94×10^{-7} S/cm. Penambahan nilai konduktiviti adalah disebabkan bertambahnya bilangan ion yang bergerak manakala penurunan nilai konduktiviti adalah disebabkan penyatuan ion-ion dan penurunan kadar pengaliran ion dalam sampel. Penambahan dan penurunan di dalam bilangan ion dijelaskan oleh plot ϵ_R melawan frekuensi. Nilai kehilangan tangen diperolehi dengan membahagikan nilai modulus elektrik, M_I dan M_R daripada data yang diperolehi. Spektroskopi inframerah pula menunjukkan struktur kompleks antara garam dan polimer kitosan/PEO.