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solid polymer electrolytes / Clement Lee Chin Yong.

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PREPARATION, CONDUCTIVITY AND FTIR STUDY ON
METHYLCELLULOSE/ACID SOLID POLYMER ELECTROLYTES

By
Clement Lee Chin Yong

A thesis submitted in partial fulfillment
of the requirement for the award of the degree of
Bachelor of Applied Science
(Electronics, Physics and Instrumentation)

DEPARTMENT OF PHYSICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
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Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:.....Preparation, Conductivity, and FTIR study of.....
.....Methylcellulose doped Acid Solid Polymer Electrolyte.....

.....oleh.....Clement Lee Chin Yong.....

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DECLARATION

I hereby declare that this thesis entitled Preparation, Conductivity and FTIR Study on Methylcellulose/Acid Solid Polymer Electrolytes is the result of my own work except as cited in references.

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PREPARATION, CONDUCTIVITY AND FTIR STUDY ON METHYLCELLULOSE/ACID SOLID POLYMER ELECTROLYTES

ABSTRACT

The studies of solid polymer behavior as a thin film electrolyte have been done by many researchers. Solid polymer electrolytes belonging to the salt-solvent-polymer hybrid system, the solvent is retained in the electrolytes and helps in dissociation of salt and also provides a medium for conduction. The prepared methylcellulose as the host doped with adipic acid as the salt (MCAA), and methylcellulose doped glycolic acid (MCGA) at different salt concentration was successful. The two sets of samples were prepared by solution cast technique. It is analyzed by the Fourier Transform Infrared Spectroscopy (FTIR) and Electrochemical Impedance Spectroscopy (EIS). EIS analysis show that the ionic conductivity for MCAA is $8.14 \times 10^{-11} \text{ Scm}^{-1}$ for the sample AA8, and the highest ionic conductivity for the MCGA is $7.16 \times 10^{-10} \text{ Scm}^{-1}$ (GA5). Both samples were increased its conductivity when increased its acid salt concentration. In the FTIR study, MCAA and MCGA show that the peaks were increasing in intensity and shifted to the higher wavenumber. The peaks at 1741 cm^{-1} (C=O) in MCAA show that the increasing intensity with the increasing of acid concentration. COH bond at 1279 cm^{-1} was released the H^+ ions and form C=O bond. The peaks in the range of 1000 cm^{-1} to 1600 cm^{-1} in MCAA shows to have shifted peaks from the peaks that determined in pure AA spectrum. 1375 cm^{-1} and 1458 cm^{-1} were assigned to the CH_2 wagging and CO stretching. MCGA shows the interaction between MC and GA in the wavenumber region 700 cm^{-1} to 1500 cm^{-1} . 951 cm^{-1} was assigned to the CH_2 rocking condition and 1431 cm^{-1} assigned to the OH bending.

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ABSTRAK

Sifat-sifat polimer pepejal bagi elektrolit filem nipis telah dikaji oleh ramai penyelidik. Polimer pepejal elektrolit dikategorikan kepada sistem bastar garam-pelarut-polimer, pelarut ditahankan di dalam elektrolit, membantu dalam proses peruraian garam dan menjadi suatu medium bagi konduksi. Persiapan sampel methylcellulose sebagai tuan rumah campur dengan acid adipik sebagai garam (MCAA) dan methylcellulose campur dengan acid glykolik (MCGA) telah berjaya. Kedua-dua kumpulan sample adalah disediakan daripada teknik sebaran larutan. Spektroskopi Fourier Inframerah (FTIR) and Spektroskopi Impidans Elektrokimia (EIS) digunakan untuk menganalisis sample yang disediakan. EIS menunjukkan kekonduksian ion tertinggi bagi MCAA sample AA8 adalah $8.14 \times 10^{-11} \text{ Scm}^{-1}$, dan kekonduksian ion paling tinggi bagi sample MCGA (GA5) adalah 7.16×10^{-10} . Kekonduksian bagi kedua-dua sample meningkat apabila konsentrasi acid meningkat bersama-sama. Dalam kajian FTIR, puncak-puncak dalam MCAA dan MCGA menunjukkan peningkatan intensifat dan geseran nombor gelombang kepada nombor yang lebih tinggi. Puncak di 1741 cm^{-1} (C=O) menunjukkan peningkatan intensifat dengan penambahan konsentrasi acid. Ikatan COH di 1279 cm^{-1} telah melepaskan ion H^+ dan membentuk ikatan C=O. Puncak-puncak MCAA antara 1000 cm^{-1} hingga 1600 cm^{-1} menunjukkan geseran puncak daripada puncak-puncak yang ditentukan dalam spektrum acid adipik. 1375 cm^{-1} dan 1458 cm^{-1} ditugaskan sebagai ibasan CH_2 dan regangan CO. MCGA menunjukkan interaksi antara MC dengan GA dalam puncak-puncak 700 cm^{-1} hingga 1500 cm^{-1} . 951 cm^{-1} telah ditugaskan kepada mod ayunan CH_2 dan 1431 cm^{-1} ditugaskan kepada ikatan OH.