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Investigation on LiTFSI doped plasticizer as potential solid electrolytes for lithium batteries / Mohd Hasmin Mhd Hanafiyah

Lihat sebelah

INVESTIGATION ON LiTFSI DOPED PLASTICIZERS AS POTENTIAL SOLID ELECTROLYTES FOR LITHIUM BATTERIES

By
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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: INVESTIGATION ON LITFSI DOPED PLASTICIZERS AS POTENTIAL SOLID ELECTROLYTES FOR LITHIUM BATTERIES

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DECLARATION

I hereby declare that this thesis entitle Investigation on LiTFSI doped Plasticizers as Potential Solid Electrolytes for Lithium Batteries is the result of my own research exept as cited in the references.

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ABSTRACT

Solid polymer electrolytes composed of chitosan and PEO as the host polymer and LiTFSI salt containing EC and PChas been prepared, respectively by the solution cast technique. These complexes with different amounts of plasticizers were investigated as possible ionic conducting polymers by using the Electrochemical Impedance Spectroscopy (EIS). At room temperature, the highest ionic conductivity of the complexes was observed at 1.06×10^{-4} S cm^{-1} for 45 wt.% of EC and 3.43×10^{-5} S cm^{-1} for 40 wt.% of PC. The ionic conductivity of the polymer blends increase with increasing the plasticizers concentration could be attributed to the increase in the number mobile ions as a result of plasticizer dissociation. Dielectric data were analyzed using complex permittivity, ε^*, complex electrical modulus, M^* and loss tangent, tan δ. The existences of M_I peaks indicate that the samples are ionic conductors. Further, the interaction of the polymer chains with the different plasticizers concentration is substantiated by Fourier Transform Infrared (FTIR) spectroscopy. The FTIR spectra have found evidence of a complexation for both EC and PC systems.

ABSTRAK

Elektrolit polimer pepejal menggunakan kitosan dan PEO sebagai hos polimer dan dikisar bersama dengan garam LiTFSI dan mencampurkannya bersama 'plasticizers' seperti EC dan PC, telah disediakan melalui teknik 'solution casting'. Kompleks-kompleks ini disediakan dengan amaun 'plasticizers' yang berbeza-beza telah dianalisis sebagai polimer pengaliran ion dengan menggunakan spektroskopi impedan elektrokimia (EIS). Pada suhu bilik, konduktiviti ionic campuran yang paling tinggi telah dikenalpasti pada 1.06×10^{-4} S cm^{-1} untuk 45 wt.% EC dan 3.43×10^{-5} S cm^{-1} untuk 40 wt.% PC. Data dielectric dianalisis dengan menggunakan kompleks ketelusan, ε^* dan modulus elektrik, M^* of the sample. Graf kehilangan tangent melawan log f juga diplotkan apabila garf ketergantungan khayalan, M_l melawan log f tidak mempunyai puncak. Seterusnya, interaksi antara rantai-rantai polimer dengan kepekatan 'plasticizers' yang berbeza-beza dianalisis oleh spektroskopi 'Fourier Transform Infrared' (FTIR). Daripada spectrum infra merah, kitosan:PEO dikisat dengan 30 wt.% garam LiTFSI dan kitosan:PEO dengan 30 wt.% garam LiTFSI campur dengan kepekatan 'plasticizers' yang berbeza-beza menunjukkan bahawa komplek ini adalah bercampur