

**WASTE COOKING OIL-BASED POLYURETHANE SOLID POLYMER  
ELECTROLYTE: THE EFFECT OF ISOCYANATE STRUCTURE**

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## ABSTRACT

### WASTE COOKING OIL-BASED POLYURETHANE SOLID POLYMER ELECTROLYTE: THE EFFECT OF ISOCYANATE STRUCTURE

Waste cooking oil-based polyurethane was prepared via solvent-free method using waste cooking oil based polyol (WCO-p) and 4,4- diphenylmethane diisocyanate (MDI) or 1,6- hexamethylene diisocyanate (HDI) with lithium trifluoromethane sulfonate (LiTFSI) salt and ethylene carbonate (EC) as plasticizer. The polyurethane films were examined using Fourier Transform Infrared Spectroscopy (FTIR) and Electrochemical Impedance (EIS), Differential Scanning Calorimetry (DSC) and X-Ray Diffraction (XRD). The ionic conductivity from EIS result of the polyurethane film mixed with MDI and salt are higher which is  $5.76 \times 10^{-6} \text{ Scm}^{-1}$  compared to film mixed with HDI and salt  $6.03 \times 10^{-7} \text{ Scm}^{-1}$ . This was proved by XRD analysis which is more amorphous than PU-HDIs. However the glass transition is highest temperature due to steric hindrance of benzene ring in hard segment for PU-MDIs. FTIR analysis showed the absence of the band in the range of  $2260$  to  $2310 \text{ cm}^{-1}$  proves there is no free NCO group that confirms the urethane reaction is complete in the structure of polymer. However that band is presence at  $2276.05 \text{ cm}^{-1}$  in PU-MDI spectrum showed not all of the isocyanate groups reacted during polymerization.

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