

**SYNTHESIS OF WASTE COOKING OIL – BASED POLYURETHANE
SOLID POLYMER ELECTROLYTES: THE EFFECT OF
PLASTICIZERS**

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ABSTRACT

SYNTHESIS OF WASTE COOKING OIL – BASED POLYURETHANE SOLID POLYMER ELECTROLYTES: THE EFFECT OF PLASTICIZERS

This study was performed to investigate the effect of plasticizers on the properties of the waste cooking oil based polyurethane (PU) solid polymer electrolytes (SPE). The polyurethane was prepared via solution casting method. Polyethylene Glycol (PEG) and Ethylene carbonate (EC) was chosen as plasticizers. The PU SPE films were characterized by using Fourier Transform Infrared (FTIR), Electrochemical Impedance Spectroscopy (EIS), Thermogravimetric analysis (TGA), Differential scanning Calorimetry (DSC) and X-ray Diffraction (XRD). The highest ionic conductivity of $8.40 \times 10^{-8} \text{ Scm}^{-1}$ was achieved with the addition of plasticizer ethylene carbonate (EC) at room temperature and thermally analysis showed by DSC is the lowest transition glass, T_g obtained at 106.0°C . TGA was analyzed that five type of thermal degradation had been obtained. These confirmed as the molecular structure of PU SPE films were investigate by FTIR and the presence of urethane linkage and disappearance of NCO in peak the FTIR spectrum showed that diisocyanate was completely reacted to form PU SPE. The XRD showed that the PU SPE EC was highly amorphous due to broad hump became broader and intensity decreased. These observations indicated the synthesized PU SPE film possessed favorable properties to act as a base material in polymer electrolytes.