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Design and Synthesis of Conducting Polymer Bio-Based Polyurethane Produced from Palm Kernel Oil

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Submitted on 2022-03-23 (a year ago)

> Abstract

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Polyurethane (PU) is a unique polymer that has versatile processing methods and mechanical properties upon the inclusion of selected additives. In this study, a freestanding bio-based polyurethane film the screen-printed electrode (SPE) was prepared by the solution casting technique, using acetone as solvent. It was a one-pot synthesis between major reactants namely, palm kernel oil-based polyol and 4,4-methylene diisocyanate. The PU has strong adhesion on the SPE surface. The synthesized bio-based polyurethane was characterized using thermogravimetry analysis, differential scanning calorimetry, Fourier-transform infrared spectroscopy (FTIR), surface area analysis by field emission scanning electron microscope, and cyclic voltammetry. Cyclic voltammetry was employed to study electro-catalytic properties of SPE-polyurethane towards oxidation of PU. Remarkably, SPE-PU exhibited improved anodic peak current as compared to SPE itself using the differential pulse voltammetry method. Furthermore, the formation of urethane linkages (-NHC(O) backbone) after polymerization was analyzed using FTIR and confirmed by the absence of peak at 2241 cm⁻¹ attributed to the sp-hybridized carbons atoms of C=C bonds . The glass transition temperature of the polyurethane was detected at 78.1 °C.