UNIVERSITITEKNOLOGIMARA

FABRICATION AND CHARACTERISATIONS OF PALM KERNEL CAKE (PKC) ACTIVATED CARBON – FERUM (II) OXIDE (AC-PKC-FE_2O_3) ONTO POLYURETHANE (PU) SUBSTRATE FOR DSSC APPLICATIONS

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ABSTRACT

The complexity of cell applications in the design of renewable source concept was using composites as electrode systems. The hard substrate leakage controlled by Polyurethane (PU) complete the use of flexible applications in Dye-Sensitized Solar Cell (DSSC) for photoconversion electrodes. In fabrication systems, the issue of the thin film sensitization source for the anode film layer was environment. The selection has surveyed organic-inorganic composite systems as new cell systems. Physical damage factor using conventional substrate in adaptation with flexible PU maintains the exposure performance of the system where the inhibitor of the substrate electrode performance is higher with catalytic efficiency. Electrode systems with high catalysis and corrosion resistance for metal replacement brought sustainable development especially waste-energy source systems. Composite materials from activated carbon (AC) sources solve a faulty electrode system for charge carrier structure and increase efficiency performance. PU material architecture using low temperature is used as an innovative electrode alternative. AC composite flexible organic electrode coatings achieve a successful catalytic network. Palm Kernel Cake AC, PKC applied onto PU substrates prepared with solution casting and Doctor Blade's method. The fabrication of electrode set of PU / AC-Fe_2O_3 thin film composite is hydrothermally processed and transformed into a layered film on PU conductive composite for catalytic elements. The characterization of AC e-transport electrode performed catalyst networks for electron charge-transport capacity of conductivity. Surface characterizations made with electrochemicals analysis interred with photo-density performance tested for PU system efficiency of photocatalytic parameter and cell photoelectro system. The PU measurement with photo-luminescent values measured photo-absorbancy and photo regeneration analyzes at 550 nm wavelength and interlined with photoelectro density spectroscopies of AC with 7 Wt% at minimal. AC has cell detriment as cell organic structure as well as high photo-electro materials for cell's electrodes and responses linear d-gap analysis and made differentials of polymer system norm to the degradation of photoabsorbtive material. The XRD revealed composite structure of catalyst networks system interacting active sites to semi-composite sites within organic-inorganic compounds extension. The Impedance (EIS) measurement applied on electrode systems found high conductivity and high corrosion inhibitor performance of AC composite where longer period of perturbed end rate indicate higher resistance. The PU/AC-Fe_2O_3 is the best regeneration facilitated composite performance in composite system electrode while PU/PKC-AC-Fe_2O_3 in-correlation, has the best in conductivity systems performance obtained a value of 10^{-3} $S.cm^{-1}$. PU optimized in a 0.3 M of NaI solution reached best conductivity of 10^{-8} $S.cm^{-1}$. The electrode produced from organic flexible substrate-composites resulted dominant IPCE in utilized AC catalyst networks. PU-N719 sensitizer system efficiency of electrode system resulting of 6.19% (FF: 0.45) while Pc system of organic binaries obtained with efficiency parameters of 2% (FF: 0.25). The flexible PU thin film cell made layers of TiO_2 and AC-Fe_2O_3 performed photo-current conversion (IPCE) at 6.5%, with the performance as highest as 6.9% for composite system. PKC-AC-Fe_2O_3 (FF: 0.64) was made and comparatively with Pt efficiency yield value at 6.5 % (FF: 0.66). The dG evaluated efficiency parameters in correlation of AC-electrodes system achieved over 95% of fill factor.

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