
FACULTY OF ENGINEERING
DEPARTMENT OF TEXTILE AND GINNING ENGINEERING
BACHELOR OF SCIENCE IN TEXTILE AND GINNING ENGINEERING
FINAL YEAR PROJECT PROPOSAL

**FABRICATION AND CHARACTERIZATION OF NATURAL
DYE SENSITIZED SOLAR CELL BASED ON TiO_2 USING
TAMARIND, EUCALYPTUS AND TEAK DYE EXTRACTS.**

BY

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ABSTRACT

The objectives of this research were to prepare dye sensitized solar cells (DSSCs) using titanium dioxide (TiO_2) based on three natural dyes of tamarind, eucalyptus globulus and teak plant.

These dyes were co-sensitized in equal proportions then used in the solar cell.

The performance of DSSCs was improved through co-sensitization of the natural dyes. The results showed that combination of teak and tamarind had the highest open circuit voltage of 0.58V and then combination of teak, eucalyptus and tamarind also had the highest short circuit current density of $0.75\text{mA}/\text{cm}^2$ and the highest efficiency was obtained with the three combinations of the dyes and it was 0.27%.

Dye sensitized solar cells were fabricated using TiO_2 as a semiconducting layer and natural dyes as photosensitizers. Thin layers of nanocrystalline TiO_2 were prepared on transparent fluorine doped tin oxide (FTO) conductive glass. Doctor blade method was used in the coating process. Three natural dyes were used namely; leaves of teak, eucalyptus globulus and tamarind. The absorption spectra of these dyes were performed. The I-V characteristic curves of all fabricated cells was measured, plotted, and analyzed. The parameters related to the solar cell performance were presented such as the maximum absorption peak (λ_{Max}), short circuit current (I_{SC}), open circuit voltage (V_{OC}), maximum power point (P_{Max}), fill factor (FF), and efficiency (η), where the absorption spectra of all dyes and the J-V characteristic curves of the fabricated cells were presented. The output power was calculated.

Key words: Dye sensitized solar cell, natural dyes, Titanium dioxide, solar cell.

DECLARATION

I **OCHULU EMMANUEL**, do hereby declare to the best of my knowledge, that this project proposal report is an outcome of my original work and that it has never been presented to any institution of learning for an academic award. All the work contained in this report is as a result of my research except where cited.

Signature.....

Date...../..... / **2020**.....

APPROVAL

This project report is submitted to the Faculty of Engineering for examination with approval from the supervisors.

Supervisors;

Dr. NIBIKORA ILDEPHONSE

Signature.....

Date.....

Mr. KASEDDE ALLAN

Signature.....

Date.....

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LIST OF ACRONYMS

TiO₂ Titanium dioxide

λ_{\max} peak wavelength

DSSC Dye Sensitized Solar Cell

Rtp Room Temperature

Te Teak

Ta Tamarind

Eu Eucalyptus

a.u Arbitrary units

T Transmittance

FTO Fluorine Doped Tin Oxide

Voc Open circuit voltage

Isc Short circuit current

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