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FACULTY OF ENGINEERING

DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL ENGINEERING

FINAL YEAR PROJECT THESIS

A BARKCLOTH-BANANA FIBER BIONANOCOMPOSITE WITH POLYESTER RESIN FOR INTERIOR AUTOMOTIVE PANEL

By

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BU/UG/2017/89

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A final year project report submitted to the Department of Polymer, Textile and Industrial Engineering in partial fulfillment of the requirements for the award of a B.Sc. In Polymer, Textile and Industrial Engineering at Busitema University

MARCH 2022

DECLARATION

I **SSEBAGALA IVAN**, declare that all the work presented in here is my original work unless cited and no one has presented it before for the award of any certificate, diploma or bachelor in any institution of learning.

Signature:……..

Date:…….

DEDICATION

This work/report is dedicated to my family, PTI pioneers class of 2022, and the entire Busitema University PTI Department fraternity for the tireless advice throughout this study period.

ACKNOWLEDGEMENT

First and foremost, I thank the Almighty God for the wisdom and Devine guidance during the entire life of cycle of this study, it's been His Grace up on me that I have managed to complete it successfully.

To my beautiful and loving family, I want to say Ebenezer because in this, we all emerge winners since we have been together through it all.

Special thanks to the Department of PTI for the knowledge and skills imparted in me and in a VIP capacity, thanks to Ass. Prof Samson Rwahwire for the parental love, guidance and support in all aspects.

Lastly, to PTI Pioneers, thanks for the love and never ceasing advice and guidance for the time we have been together for the struggle. "FAREWELL"

ABSTRACT

In the recent years, there has been a deep study in the area of bio-based polymer composites following the rapid depletion of petroleum resources as well as finding solutions to the increasing environmental issues caused by petrochemical composites, by developing eco-friendly, cheaper, eco-compatible and more sustainable green composites. The purpose of this article therefore is to present a summary of the potential use of barkcloth-banana fiber reinforced polyester resin biocomposites particularly for interior automotive applications.

Two categories of biocomposites were prepared, those (1) based on untreated banana fibers and barkcloth, denoted by A1, B1, C1, D1 and (2) based on 5% NaOH treated banana fibers and barkcloth treated with nanocellulose denoted by A, B, C, D. Banana fibers were soaked in the alkali solution for 12 hours. Nanocellulose was extracted from barkcloth using the acid hydrolysis method and applied on the barkcloth fabrics by Pad-Dry-Cure method with concentration of 1% nanocellulose. The effect of nanocellulose was studied using FT/IR, SEM and DSC and it was concluded that treated barkcloth had better bonding capacity with the resin and thermally stable than the untreated barkcloth. While, the alkali-treatment of banana fibers degraded them rendering them brittle and consequently reduced their tensile and bending strength. The mechanical properties of both composites categories were also studied and it was found out that sample D1 showed the best tensile and flexural strength attributed to the fact that it was based on the un-degraded untreated banana fibers as opposed to the degraded alkali-treated banana fibers. Lastly, it was concluded that ‘the more the banana fiber layers, the higher the tensile and flexural strength’. According to literature, the threshold tensile and flexural strengths are 25MPa and 30MPa respectively and in relation to the obtained results, barkcloth and banana fibers can be used for reinforcing polymer matrices for automotive interior applications.

APPROVAL

This project report was compiled and submitted to the department of polymer, Textile and Industrial Engineering under the constant supervision of the supervisors below;

Main supervisor

Ass. Prof Dr Samson Rwahwire

Signature:……

Date:……

Co-supervisor

Mr Tumusiime Godias

Signature:…….

Date:…….

Table of Contents

LIST OF FIGURES

LIST OF TABLES