FACULTY OF ENGINEERING

DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL ENGINEERING

FINAL YEAR PROJECT REPORT

SURFACE MODIFICATION OF POLYESTER FABRIC USING MICROCRYSTALLINE CELLULOSE EXTRACTED FROM WASTE PAPER.

BY:

NAYEBARE PEACE

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E-mail: peacebisiriikonayebare@gmail.com

SUPERVISORS:

MADAM NAMUGA CATHERINE

DR KAMALHA EDWIN

A report submitted on completion of the requirements for the award of a degree of science in polymer, textile, and industrial engineering.

ABSTRACT

This study was carried out to shed light on the effect of microcrystalline cellulose obtained from the waste paper on the surface of polyester fabric. The MCC was extracted from waste paper using HNO_3, HCl and H_2SO_4 hydrolysis, after which the extracted MCC is characterized and the effect of MCC on the polyester fabric surface is then cataloged in detail. The MCC extracted is characterized using SEM and FT-IR analyses. The purpose of the FTIR spectra is to illustrate that each MCC has a -OH group and that the C-O on cellulose fiber I and cellulose II is stretched. The rotation of the glucose residue around the glycosidic bond in C-O bonds changes into Cellulose II whereas the SEM uses electron beam which interacts with atoms at different depths inside the sample, creating a variety of signals that carry information on the physical properties and characteristics of the material

Based on the results obtained from the study, it can be seen that the treatment with microcrystalline cellulose powder along with the binder significantly increased the wetting behavior of treated fabrics measured in terms of absorbency and the polyester coated with MCC obtained by hydrolysis of HCl gave the highest value of moisture regain of 7.76%. it was also observed that the morphology of the MCC was determined which indicated the removal of lignin, hemicellulose and other impurities. The chemical composition of the MCC was also determined using the FTIR. The tensile strength, GSM, thickness and the moisture regain of the treated polyester fabrics increased due to either the presence of OH groups on the fabric surface. Finally, there was decrease in air permeability which may be due to the applied coating reducing on the porosity of the fabric.

Keywords: Microcrystalline cellulose, acid hydrolysis, moisture regain, FTIR, SEM.

DECLARATION

I **NAYEBARE PEACE** Reg No: **BU/UG/2017/75** a student of Busitema University in the Department of Polymer, Textile and Industrial Engineering hereby confirm and certify that the information in this project proposal report is an original account of what I paraphrased after reading several research papers which relates to microcrystalline cellulose extraction and surface modification of polyester fabrics.

Signature: ...……

Date: ……...

APPROVAL

This final year research report has been submitted for examination with the approval of the following supervisors.

Signature: …….

Date: ……

Madam Namuga Catherine

Signature ……....

Date……

Dr Kamalha Edwin

DEDICATION

This research is dedicated to my parents, Mr. David Bisiriiko and Justine Bisiriiko who have been a strong pillar in my academic journey.

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I also would like to thank **Dr. Kigozi Moses** for the guidance and support he rendered to me when I was doing this research and surely May the Almighty God reward him abundantly. I also acknowledge the chemistry department Nagongera Campus, and the Materials laboratory Busitema Main campus for the support they rendered to me.

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