



**FACULTY OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL ENGINEERING**

**FINAL YEAR PROJECT**

**GREEN SYNTHESIS OF SILVER NANOPARTICLES USING CAMELLIA SINENSIS  
AQUEOUS LEAF EXTRACT FOR DYE WASTEWATER TREATMENT**

**BY**

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A final year project submitted to the department of Polymer Textile and Industrial Engineering as a partial fulfillment of the requirement for the award of bachelor's degree in Polymer Textile and Industrial engineering of Busitema University.

## ABSTRACT

Nanotechnology provides an environmentally friendly green technique for synthesizing silver nanoparticles using various parts of the plants. In this research, aqueous leaf extract of the *Camellia Sinensis* plant was used. The optimum concentration of silver nitrate solution used as a reducing agent was 1mM, the optimum reaction temperature used for the synthesis of silver nanoparticles was 100°C and the optimum volume of leaf extract used was 5mls. Change of color was observed within 5 minutes of the reaction which was confirmation of presence of silver nanoparticles. Characterization of the silver nanoparticles was done using the UV-VIS spectrophotometer and FTIR. The synthesized silver nanoparticles gave a maximum peak wavelength ranging from 380-450nm which was a confirmation of their presence. 10mls of silver nanoparticles was used to decolorize 100mls of dye wastewater at a temperature of 30°C for an incubation time of 30 minutes.

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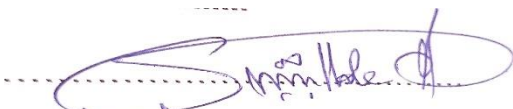
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## APPROVAL

The following supervisors have confidently approved this report submitted to the department of Polymer Textile and Industrial Engineering.

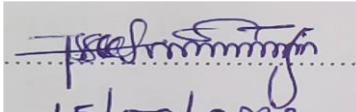
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## DECLARATION

We BAKUNDA FRANCIS AND AMATI ALLEN hereby declare that this final year project report was written by us and it has not been utilized for academic award by any individual in any learning institution

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Date: 13/09/2023 .....

## DEDICATION

I BAKUNDA FRANCIS dedicate this report to My beloved Mother Mrs. Lydia Tusingwire, and my Beloved brother Mr. John Owoyesigyire who endlessly supported and motivated me towards my goal and throughout the project.

I AMATI ALLEN dedicate this report to my beloved mother Mrs. Alice Chandiru and my Beloved father Mr. Viyo Robert who endlessly supported and motivated me towards my goal and throughout the project.

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## LISTS OF ACRONYMS

AgNPs.....Silver Nanoparticles

NDP.....National Development Plan

SDG..... Sustainable Development Goals

NTO..... Nanocrystalline Titanium di Oxide

JCPDS.....Joint Committee on Powder Diffraction Standard

## CHAPTER ONE: INTRODUCTION

This chapter discusses the background of the study, the problem statement, the objectives of the project and the reasons why the project should be carried out.

### 1.1 BACKGROUND

#### 1.1.1 Nanotechnology

The science and technology related to diverse nanostructures has expanded into a significant area of study for the advancement of human society, and the technology is rapidly developing to have significant commercial influence in the future. Taniguchi coined the phrase "nanotechnology" for the first time in 1974. He claims that the processes of material separation, consolidation, and deformation by a single atom or molecule comprise nanotechnology(Goutam et al., 2020). To put it another way, the study of nanoparticles that have exceptional qualities, functions, and phenomena because of their small size is another application of nanotechnology(Khan et al., 2017). The word "nano" comes from the Greek word Nanos which refers to small animals or plants. The one-nanometer scale is equal to  $10^{-9}$  m. The aim of nanotechnology is to measure and manipulate the matters at nanoscale; the scale of its dimension lies in the range of 1–100 nm(Mansoori & Soelaiman, 2005). At nano-level, material shows unique chemical, physical, and biological properties due to higher surface to volume ratio where the surface area of the nanoparticle is inversely proportional to particle size, which probably occurs due to the increasing order of surface atoms with respect to the decreasing order of particle size(Goutam et al., 2020). Consequently, because to its extraordinarily high surface energy and enormous surface area, the nanoparticle exhibits unique optical, electrical, and magnetic capabilities(Goutam et al., 2020).

Nanoparticles were usually synthesized through the physical and chemical processes but these processes present many drawbacks such as being toxic to the environment, expensive and complicated procedures, which led to the development of new techniques of nanoparticle

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