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GREEN SYNTHESIS AND OPTICAL PROPERTIES OF ZnO NANOPARTICLES

BY

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DECLARATION

I Owori Samuel hereby declare that this research project entitled "Green Synthesis, size and optical properties of Zinc Oxide Nanoparticles", under the guidance of Dr. Angela Karoro and Ms. Akoba Rashidah is my own original work and has never been presented and/or submitted to any other University or Institute of learning for any academic award.

Sign……

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DEDICATION

I would like to dedicate my dissertation work to my beloved parents Mr. Okiru Godfrey and Arotin Margaret, my dear wife Mwanayidi Mwekali and baby Nolan for their guidance, motivation and support throughout my academic journey. A special feeling of gratitude to Dr. Angela Karoro and Ms. Akoba Rashidah who stood by my side with tireless guidance and support till completion of this research.

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ABSTRACT

Human's quest for innovation, finding solutions to problems, and upgrading the industrial yield with energy efficient and cost effective materials has opened the avenues of nanotechnology. Among various nanoparticles, Zinc oxide nanoparticles (ZnONPs) has broad applications in various areas. Green synthesis is an alternative to conventional physical and chemical methods. Green synthesis of nanoparticles is gaining importance due to its cost-effectiveness, reduction of toxic chemicals and extensive antimicrobial activity. Green synthesis of zinc oxide nanoparticles (ZnONPs) using agro waste materials particularly goat faecal matter as a reducing agent. Synthesized ZnONPs were evaluated for particle size, absorbance and photoluminescence properties using UV–visible spectroscopy. Agro-waste based green synthesized ZnONPs possess small sized particles, which enhances the good antimicrobial effect. This research will also provide a means of transforming goats wastes which would otherwise contaminate the environment into ZnONPs whose optical properties is studied for optoelectronic uses.

LIST OF ACRONYMS USED

ZnO	Zinc Oxide
GaNp	Gallium nanoparticles
ZnONPs	Zinc oxide nanoparticles
g/mol	Gram per mole
UV	Ultra violet
G	Gram
Ml	Milliliter
W	Watts
Hr.	Hours

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter introduces the background of the study, problem statement, aim and objectives, the scope as well as the significance of the study.

1.1 Background of the study

Nanotechnology is a field that deals with technology development at atomic, molecular and macromolecular scales of particles known commonly referred to as nanoparticles. The term "nanoparticles" is used to describe a particle with size in the range of 1nm-100nm.Among the metal oxide nanoparticles, zinc oxide nanoparticles have drawn the attention of many researchers for their unique optical and chemical characteristics which can be easily tuned by changing the morphology. Zinc oxide (ZnO) is a wide band gap semiconducting material having band gap of 3.37 eV at room temperature. It is a very useful material for different technological applications like optical, optoelectronic devices, flat panel displays, liquid crystal displays and thin film photovoltaic devices, transparent electronics etc. [32]. The nanoparticle attract much interest for their applications in future optical and optoelectronic applications due to their typical properties such as high optical transmittance in visible and near IR-region, high electrical conductivity and high chemical and physical stability. Along with the experimental studies synthesis and characterization of the physical and chemical properties, it is highly dispensable and important to study these properties practically to predict the optimized properties of the same before implementing the materials for above-mentioned applications. Specifically for the applications in optical and optoelectronic devices, it is extremely important to study the different optical properties like refractive index, extinction coefficient, transmittance and reflectance with varying the wavelength or energy of the incident light as a function of optical wavelength to predict the optical behavior of a device. ZnO single crystals are used as substrates for obtaining gallium nitride thin films, since both crystals (ZnO and GaN) belong to the wurtzite structural type and parameter of their lattices along the z axis is 1.8% [10]. Recently, powders, films, and ceramics of zinc oxide have been finding use in the scintillation technique. Due to its vast areas of application, various synthetic methods have been employed to grow a variety of ZnO

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