Surfactant assisted synthesis of nanocrystalline nickel oxide and its bioactivities

By:

Zahid Masood

ID: 15005140005

SUPERVISOR:

Dr. Sammia Shahid

DEPARTMENT OF CHEMISTRY
SCHOOL OF SCIENCE
UNIVERSITY OF MANAGEMENT AND TECHNOLOGY,
LAHORE, PAKISTAN

2017

Surfactant assisted synthesis of nanocrystalline nickel oxide and its bioactivities

Submitted to University of Management and Technology Lahore

In partial fulfillment of the requirements

For the award of degree of

MS
IN
CHEMISTRY

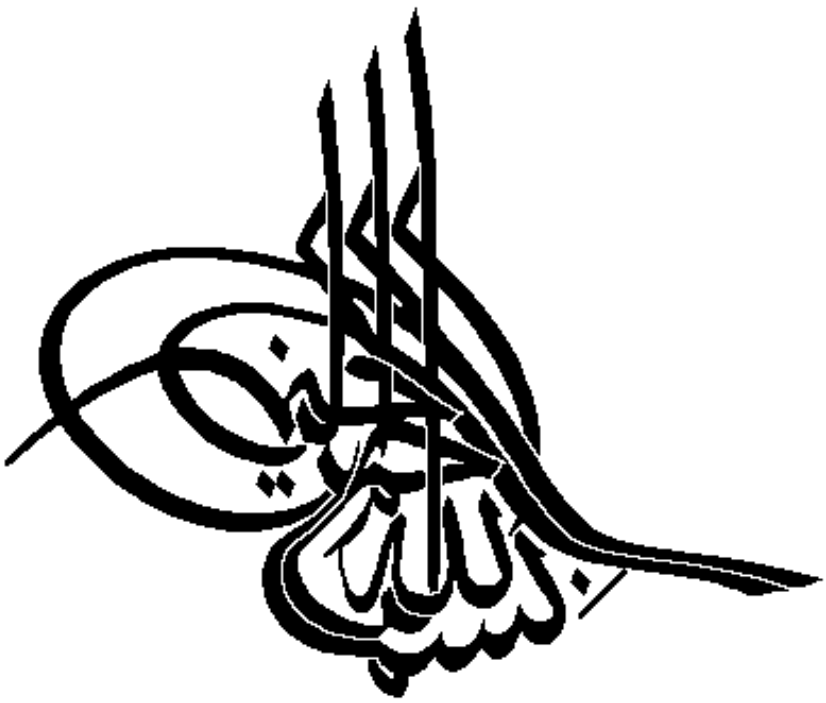
BY
Zahid Masood

ID

1	5	0	0	5	1	4	0	0	0	5

SESSION: 2015-2017

DEPARTMENT OF CHEMISTRY
SCHOOL OF SCIENCE
UNIVERSITY OF MANAGEMENT AND TECHNOLOGY,
LAHORE, PAKISTAN



In the name of

Allah,

The most Compassionate,

The most merciful

University of Management and Technology, Lahore

Similarity Report

Turnitin Originality Report

SURFACTANT ASSISTED SYNTHESIS OF NANOCRYSTALLINE NICKEL OXIDE AND ITS BIOACTIVITIES by Zahid Masood

From Reference Desk (Nov) (LRC (Info))

- Processed on 06-Dec-2017 18:38 PKT
- ID: 891230179
- Word Count: 12664

Similarity Index
9%
Similarity by Source
Internet Sources:
5%
Publications:
6%
Student Papers:
2%
sources:
1

1% match (Internet from 16-Aug-2016)
https://www.springerprofessional.de/en/size-controlled-nickel-oxide-nanoparticle-synthesis-using-mesopo/5667192
2

1% match (Internet from 19-May-2016)
http://cityusr.lib.cityu.edu.hk/jspui/handle/123456789/11941

Checked by

Verified by CLO

Note:
- Sometimes the overall similarity index may be a smaller than the repository percentages combined. This would be due to overlapping text within the repositories.
- It is a system generated report.

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis titled, "Surfactant Assisted Synthesis of Nanocrystalline Nickel oxide and its Bioactivities" has been carried out and completed by **Zahid Masood, ID: 15005140005.** The quantum and the quality of the work contained in this thesis is adequate for the award of Degree of MS/M.Phil.

_____	_____
Supervisor	**External Examiner**
_____	_____
Chairperson **Dr Sammia Shahid** **Associate Professor** Department of Chemistry, UMT, Lahore.	**Dean** **Dr Muhammad Azhar Iqbal** **Professor** School of Science, UMT, Lahore.

DECLARATION

I Zahid Masood S/O Muhammad Bashir ID : 15005140005

Session **2015-2017** hereby declare that the matter printed in the thesis titled **"Surfactant Assisted Synthesis of Nanocrystalline Nickel Oxide and its Bioactivities**" is my own work and has not been printed, published and submitted as research work, thesis or publication in any form in any University, Research institution etc. in Pakistan or Abroad.

Dated: 20/11/2017

_____

(Zahid Masood)

DEDICATION

Dedicated to My Parents and My Family, Due to their Prayers and Co-operation, I am able to complete this thesis work.

ACKNOWLEDGEMENT

First and foremost, My great thanks to **ALLAH** and Holy prophet **Muhammad (P.B.U.H).** All praise and glory to **Almighty Allah (Subhana hoo taala)** who gave me courage and patience to carry out this work. Peace and blessings of **Allah** be upon last **Prophet Muhammad (P.B.U.H).**

I would like to express my sincere thanks to my Research Supervisor **Dr. Sammia Shahid,** Chairperson of the Department of Chemistry, University of Management and Technology for her continuous guidance, co-operation, direction, caring patience, and excellent knowledge. She helped me much, and at every step for completion of my thesis. I could not forget her kindness and sincerity about my work.

I extend my sincere thanks to **Dr. Muhammad Azhar Iqbal,** Dean of School of Science, University of Management and Technology and all faculty members, **Dr. Ayesha Mohy-Ud-Din, Dr. Sohail Nadeem, and Dr. Khurram Shahzad Munawar** for their encouragement and for questioning about my work, my thanks to all university colleagues and laboratory assistants, especially **Mr. Muhammad Rizwan Tariq** for help and guidance. I will remember their memories for years to come.

My special thanks for **Mr. Muhammad Asif Chattha, Mr. Muhammad Ishfaq Ahmad, Mr. Waqas Mohi-Ud-Din** and **Miss Umm-e-Farwa,** all the colleagues of **Pakistan Drugs Testing Research Center (PDTRC)**, and friends for their continuous support and guidance towards the completion of this thesis.

Last but not the least; I would also express my sincere thanks to my parents and other family members for their encouragement and support throughout my MS Study, this Research and Thesis.

Zahid Masood

ABSTRACT

Nanoparticles research is increasing day by day as the properties of materials can be easily altered by changing their shape, size and chemical behaviour. Nickel is mostly available in the form of ores and sometimes found free in nature as well. It is electrically conductive and hence used for several applications. Nickel nanoparticles are difficult to prepare as they readily oxidize. Elevated temperature (550°C) and capping agent is used to enhance its stability. The powdered nanoparticles were characterized by, Fourier transform infrared (FT-IR) spectroscopy, X-ray diffraction pattern (XRD) and Energy dispersive X-ray diffraction analysis (EDX). The surfactant assisted nanocrystalline Nickel oxide powder have various uses in industry due to its catalytic, antibacterial and dye degradation properties. Antibacterial Activities of Nickel oxide nano crystalline powder checked by zone of inhibition method against Gram –Ve and Gram +Ve bacteria proved them to be future broad spectrum antibiotics.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF IMAGES

LIST OF GRAPHS

NOMENCLATURE

XRD	X-ray diffraction
SEM	Scanning electron microscope
EDX	Energy dispersive X-ray spectroscopy
TEM	Transmission electron microscope
FTIR	Fourier Transform Infrared spectroscopy
NiO	Nickel oxide
nm	Nanometer
mm	Millimeter
m	Meter
A	Ampere
g	gram
V	Volts
eV	Electron volts
UV	Ultraviolet
Vis	Visible
°C	Degree centigrade
GHz	Giga hertz
f	Femto
dB	Decibels
PSI	Per square inches

CHAPTER - I

INTRODUCTION

1.0 What are nanoparticles?

Tailored nanoparticles have specific size in the range of 1 – 100nm, and their properties are not shared with non-nanoparticle scale. Particle size is one of key point in defining properties of nanoparticles. Size of nanoparticles is also responsible for their impact on human and environment. Their specific dimensions for 1 – 100nm range, separate them from other size particles. The nanoparticles are ingested by humans through respiration and ingestion or both, and have effect on their health, which is related to their resident time in the body and environment effect and are directly related to their particle size. However their physical properties are dependent on surface structure. These include dissolution and redox oxygen species. They also depends on their biological properties and their effect on environment. In metal oxide nanoparticles small size played an important role and enhance their properties and separate them from bulk materials. Nanoparticles having size 20-30 nm possess extra surface energy and are thermodynamically unstable. So rearrangement in the Crystal lattice occur to get stability, also there is sharp increase in bandgap energy as diameter is below 6-8 nm, which depends on the electronic states (Auffan et al., 2009).

But in recent years, with advanced technology relating to this field, have made revolution in the industry, which emphasis the safety, regulatory and ethical issues, as thousands of products have been made, and same number are under fabrication process in the nanoparticles technologies (Kreyling et al., 2010).