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Combination and classification of ZnO Nano Particles using massive drink Wort leaves using by Green Chemical Reduction Method

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Abstract:

In attendance study focuses on the removal of ZnO nano particles by green chemical reduction method from the bio components of leaves extract of Gigantic-Swallow-Wort. X-Ray Diffraction (XRD), FT-IR Spectroscopy characterizations was done for synthesized ZnO nanoparticles. X- ray diffraction studies showed that the particles are hexagonal in scenery.

Keywords — Green chemiccal reduction mtehod. XRD, FTIR

I. INTRODUCTION

Now a day, nanotechnology is a quickly growing technology in the 21st century. Major research work is departure on in this field. Nanoparticles exhibit completely new or enhanced properties with larger particles of the bulk materials and these work of fiction properties are derived due to the variation in specific characteristics such as size, distribution and morphology of the particles (Ravindra P Singh et al, 2011).The use of plants for the synthesis of nanoparticles novel and provides a cost-effective and environmentally friendly alternative to chemical and physical synthesis.

Zinc oxide (ZnO) is a wide band gap (3.37 eV) and high excitation binding energy of (60 meV) at room temperature [1,2] and has unique optical and as well as excellent thermal and chemical stability [3]. ZnO Nps have very large surface area with potentially low manufacturing cost. The shape and size of nano materials immensely affect their physical and chemical properties. Zinc oxide is an important wide-band-gap semiconductor and can also be applied as varistors, transparent conductors, transparent UV-protection films and chemical sensors [4,5]. Nanoparticles having one or more dimensions of the order of 100nm or less-have attracted considerable attraction due to their unusual and fascinating properties, with various applications, over their bulk counterparts [6, 7]. Currently, a large number of physical, chemical, biological, and hybrid methods are available to synthesize different types of nanoparticles [8-11].

To prepare ZnO Nps with a variety of morphologies have been successfully synthesized by several methods [12-17]. Recently, efforts were focused on the synthesis of size and shape controlled ZnO Nanoparticles by diverse methods [18, 19]. However, the production of eco-friendly, low cost ZnO Nps in large scale by the existing routes still remain difficult [20].

II. MATERIALS AND METHODS

A. *Supplies*

Zinc nitrate and utilized ingredients with analytical grade chemicals were purchased from Merck and used without further purification. Distilled and deionized water was used in this work. The leaves of Gigantic-Swallow-Wort plant collected form our surround places.

B. *Research of leaf extort*

For the preparation of leaves extract fresh leaves were collected from Gigantic-Swallow-Wort plants. The leaves were washed several times with

water to remove the dust particles and then sun dried to remove the residual moisture. The dried leaves were cutted and grinded for powder. Then taking 10 gm of dried Gigantic-Swallow-Wort leaves boiled in 50 ml of deionised water for half an hour. The mixture solution cooled at room temperature. The leaves extract filtered utilizing filter paper.

C. Green synthesis of ZnO nanoparticles using leaf Extract of Gigantic-Swallow-Wort Plant.

For the ZnO nanoparticles synthesis, 50 ml of Gigantic-Swallow-Wort leaf extract was taken boiled to 70-80 C. using magnetic stirrer heater. 5 grams of Zinc Nitrate was added to the solution as the temperatures reached 60 degree Celsius. This mixture is then boiled until it reduced to a deep yellow coloured paste. This paste was then collected in a ceramic crucible and heated in an air heated furnace at 400 degree Celsius for 2 hours. A light yellow coloured powder was obtained and this was carefully collected and packed for characterization purposes.

III. RESULTS AND DISCSSION

A. FTIR Spectra analysis

The FTIR spectrum of ZnO nanoparticles is shown in Figure 1. The IR spectrum of transmittance was taken by using a Bruker FT –IR instrument operating at a resolution of 4000-400 cm-1. In IR spectra, the absorption peak at 437 cm-1 indicates the presence of ZnO nanoparticles. The sharp characteristic peaks are also observed in FTIR spectrum of ZnO particles synthesized from Zinc Nitrate suggesting the high crystalline nature of ZnO nanoparticles.

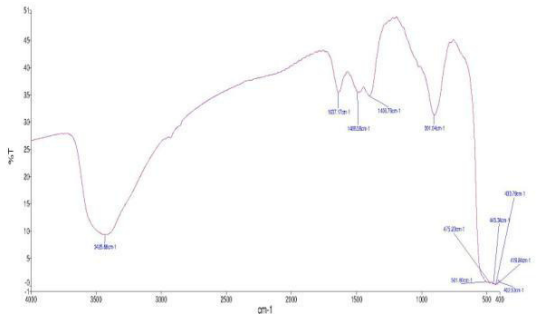

Figure 1. FTIR spectrum of ZnO nanoparticles

B.X- ray diffraction analysis of ZnO nanoparticles:

XRD spectrum of the prepared ZnO nanoparticles was carried out using XRD for 2? values ranging from 20 to 70° using CuKa radiation at ? = 1.5406Å. In ZnO, the 2? values with (hkl) plane at 33.5°(100), 35.2°(002), 37.1°(101), 47.4°(102), 57.5°(110), 62.8°(103) and 67.8°(201) were observed. The spectrum (Figure 2.) confirmed the hexagonal zinc oxide structure for ZnO nanoparticles. The average particle size (D) of synthesised nanoparticles was calculated using the well known Scherrer formula

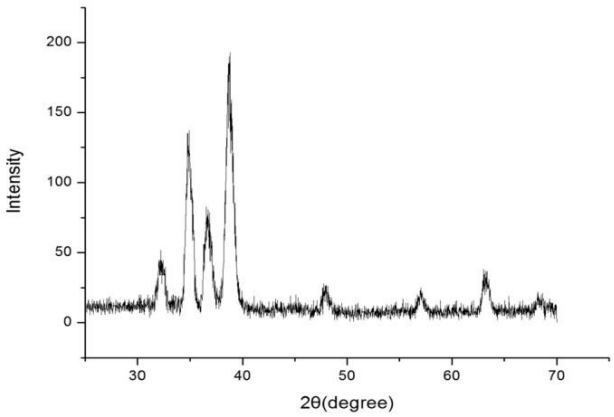

Figure 2 XRD spectrum of ZnO nanoparticles

CONCLUSION:

ZnO NPs was synthesized by the green chemical reduction method using Gigantic-Swallow-Wort leaf extract is simple and cost effective. The as prepared ZnO nanoparticles were characterized using several techniques such as XRD and FTIR. The FT-IR studies showed an absorption peak at 437 cm-1 (Zn-O linkage) which indicated the formation of zinc
oxide nanoparticles. From XRD analysis, the structure of the ZnO particles is confirmed as hexagonal with average particle size 28.38 nm.

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