GREEN SYNTHESIS OF ZINC NANOPARTICLES FROM ACALYPHA INDICA PLANT

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ABSTRACT

Acalypha Indica plant has many traditional medicinal uses, especially as an emitic, purgative, vermifuge and scabicide. In Madagascar the crushed plant is applied to treat skin parasites. In Mauritius the sap of crushed leaves mixed with salt, or a decoction of plant, is applied to treat scabies and other skin problems. If there is one herb that we should all get to know and use it in our daily lives for it's many health benefits and uses, it is Acalypha Indica. It is called "Kuppaimeni" in Tamil because it is a plant that grows everywhere like weed, and need no maintenance at all. Kuppaimeni' s botanical name is Acalypha Indica and it is called "Indian Nettle" in English. On the first onset of rains, you will find Acalypha Indica plants propping up all over the place. Since it is raining continuously here, the whole farm is filled with Acalypha Indica plants. Acalypha Indica leaves has amazing health and skin benefits and is used for treating cold, all skin related diseases and even for unwanted hair removal. I think we get Acalypha Indica leaves powder in the markets nowadays. We discussed on the Synthesis and characterization of zinc Nanoparticles by green synthesis method. It attempt was made to zinc Nanoparticles is prepared by using a medicinallyplant Acalypha Indica Zinc acetate as used to synthesis the zinc Nanoparticles by using leaf extract of Acalypha Indica. The optical characterization was carried out using UV – Visible and FT – IR analysis.

Keywords: zinc Nanoparticles, Acalypha Indica, UV

INTRODUCTION

Most of the plants used today were known to the people of ancient cultures throughout the world and were highly considered their preservative and medicinal powers. India has a rich flora that are widely distributed throughout the country.

Herbal medicines have been the basis of treatment and cure for various diseases and physiological conditions in traditional methods practiced such as Ayurveda, Unani and Siddha. The dried leaves of Acalypha indica were made into a poultice to treat bedsores and wounds and the juice of Acalypha indica is added to oil or lime and used to treat a variety of skin disorders [1-6]. The leaves of Acalypha grandis have also been reported to possess contraceptive activity Acalypha indica is an herb dispersed during India and other topical regions of the world. The various parts of the plant are commonly used in a diversity of ailments in traditional system of medicine such as Ayurveda and Siddha. The paste of plant leaves is used for the treatment of skin diseases by rural people. Traditional medicines derived from medicinal plants are used by about 60% of the world's population. Though there are various approaches to control diseases and their secondary complications, herbal formulations are preferred due to lesser side effects and low cost. The use of and search for drugs and dietary supplements derived from plants has been increased in recent years. Botanists, Ethno pharmacologists, microbiologists, and chemists are combing the earth for phytochemicals and drugs which could be developed for treatment [7-10]. Acalypha indica contains terpenoid, flavonoid, and steroid types of compounds that build it helpful as an anti-inflammatory and analgesic agent. Acalypha indica helps in removing phlegm from the respiratory region and hence is practical in treating cough and inhalation difficulties. Nanotechnology research has gained momentum in the recent years by providing innovative solutions in the field of biomedical, materials science, optics and electronics. Nanoparticles are essentially a varied form of basic elements derived by altering their atomic and molecular properties of elements. The applications of nanoparticles are wide and diverse: interactions of nanomaterials with living cells and tissues, researches in polymer nanocoupling, creation of biohybrid systems (artificial muscles), regenerative medicine (protometrocytes and nervous cells, bone tissue), nanomedicine (drug delivery, cell therapy) and others. Green synthesis procedures involve the plant based synthesis of nanoparticles. Green synthesis techniques make use of somewhat pollutant-free chemicals for synthesis of nanostructures. It embraces the use of ecofriendly and safe solvents such as water, natural extracts. So biological approaches using microorganisms and plants or plant extracts for synthesis of metal nanoparticles have been suggested as safe alternatives to chemical methods.

Green chemistry reduces pollution risk at source level and it is enhanced to prevent waste rather than treat or clean up waste after it is formed [12-15]. The principle focuses on choice of reagents which are ecofriendly. Although physical and chemical methods are quick and easier for nanoparticles synthesis the biogenic technique is better and ecofriendly. Senthilkumar and Sivakumar[3] synthesized ZnO nanoparticles using the leaf extract of *Camellia sinensis* and characterized by various techniques. The results of the UV-Visible spectrum give the absorption peaks at 325 nm and by XRD result, the average size of ZnO nanoparticles is found to be 16 nm. The antibacterial activity and antifungal activities are carried out using Agar well diffusion method on pathogenic species. Niranjan Bala *et al*. prepared ZnO nanoparticles using *Hibiscus subdariffa* leaf extract and found that thegrowth of the ZnO nanoparticles depend on the annealing temperature. It is confirmed that the increase of temperature decreases the size of the particle. Antibacterial activity of the particles is analyzed using gram (+ve) positive and gram negative bacteria [4,11].

EXPERIMENTAL

Materials

Zinc acetate di hydrate and NaOH were procured from SD fine chemicals. Acalypha indica leaf were collected from the Botanical garden.

Preparation of the Leaf Extract

Acalypha indica leaf were collected and used to prepare the aqueous extract. Leaf weighing 30gm was carefully washed in distilled water, dried, cut into fine pieces and were compressed into 100ml distilled water was added and boiled to 60°C – 70°C for about 15mins. Then the resulting crude extracts filtered through filter paper.

Synthesis of Zinc Nanoparticles

In this method, 0.25 g of zinc acetate dehydrate was dissolved in 40 ml water. 5 ml of the extract of Acalypha Indica was treated dropwise and the resulting mixture was stirred for 15 minutes using a magnetic stirrer. In order to alter the pH of the solution to pH 12, NaOH (2 M) was taken drop-wise while stirring.

A white crystalline precipitate was obtained, which is washed repeatedly with water, filtered and dried in an oven at 60°C to obtain the Znnanoparticles

RESULTS AND DISCUSSION

Zinc nano particles have used in the paint industry, ceramic industry Figure.1. Shows the FTIR spectrum of the Zn nanoparticles synthesized from solgel method,which was acquired in the range of 400-4000 cm-1 . The peaks in the range of 1450-1500cm-1 corresponds to the C=O bonds. The adsorbed band at 1563 cm^{-1} is assigned O-H bending vibrations.

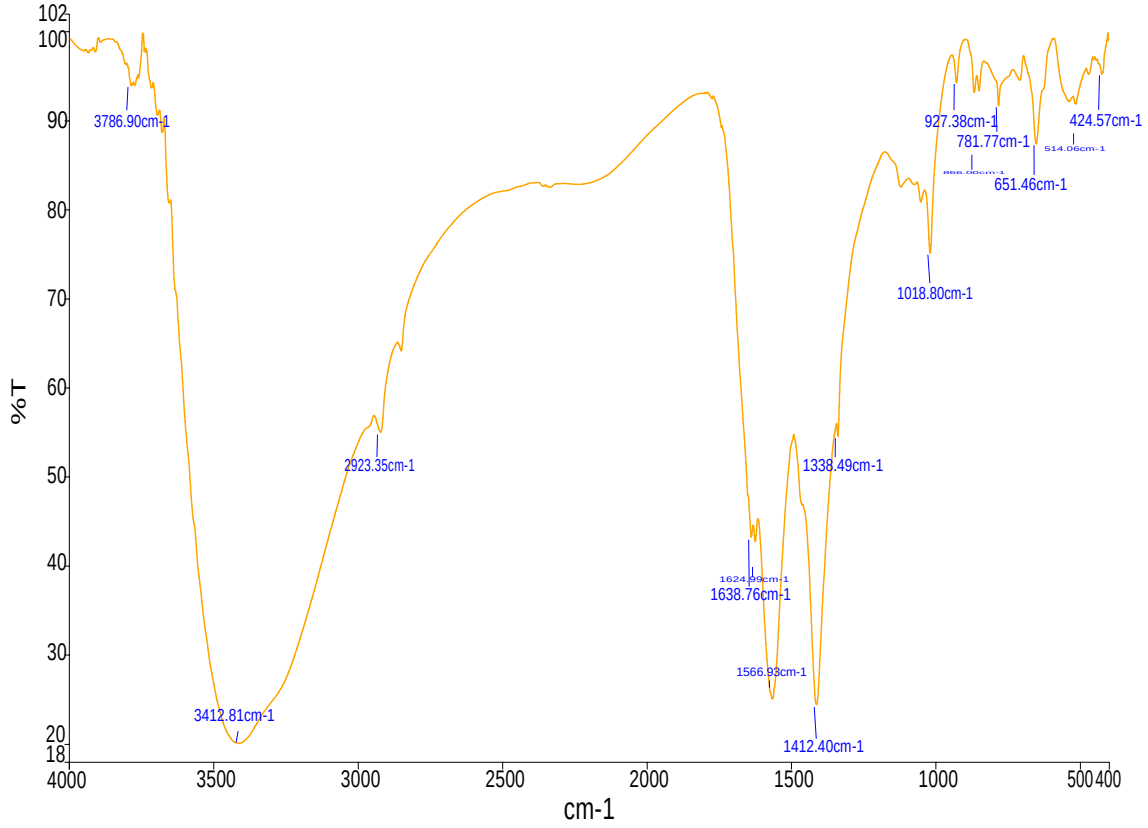
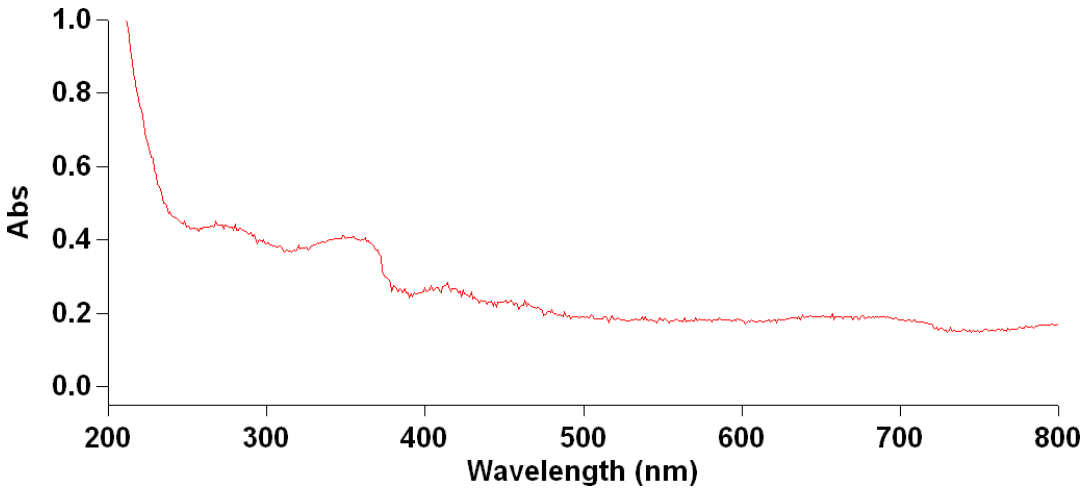


Fig.1 FTIR spectrum of nanoparticle

The peak at 1412cm^{-1} corresponds to C=O and The FTIR spectrum of zinc nanoparticles in case both of Acalypha Indica ratios showed the band between 3440-3500 cm-1 corresponds to O-H stretching .

UV-Visible spectra analysis

Zn nanoparticles prepared using the extract obtained from Acalypha indica the leaf is subjected to record UV-Vis spectroscopy. Figure No.2 shows the photograph of the UV-Vis spectra of Zn nanoparticles prepared from the extracts of Acalypha indica. The absorption peaks is obtained at the wavelength 286.5nm.



CONCLUSION

The rapid biological synthesis of zinc nanoparticles using Acalypha indica extract provides environmental friendly, easy and competent route for synthesis of gentle nanoparticles. The prepared nanoparticles was estimated to be of size 300-600 nm. Which were found from the characterization using UVvis spectrophotometer and FTIR techniques.

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