

# Synthesis and Characterization of Iron Bimetallic Nano Particles from Neolamarckiacadamba

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**Abstract:** *This paper describes rapid, sensitive and specific method for the preparation of bimetallic nano particles of Iron and Zinc which are later used in various pharmaceutical preparations and also in Electrochemical cells from green compounds along with characterization techniques. The physicochemical properties of the bimetallic Fe-Zn nanoparticles were investigated via TEM, SEM-EDX, XRD, IR and BET surface area analysis. SEM analysis confirmed the presence of nanoparticle crystals useful for the determination of the porosity, particle shape, and size. Therefore, the morphology of the nanomaterial was spherical in shape, and the particle size was in the nano range.*

**Keywords:** Bimetallic Nano particles of Fe & Zn, Green synthesis, Characterization techniques IR, SEM

## I. INTRODUCTION

The word nano means 'dwarf' in Latin that is billionth part of a meter. Nanoparticles and their synthesis from ecofriendly materials is a most applicative technique nowadays. The combination of biological science and nanotechnology has created a new pathway for research in numerous disciplines. Metallic oxide NPs based on natural resources are economically significant because they can be used for biomedical treatments of diseases and act as, for example, anticancer agents. Neolamarckiacadamba is a healthy, fresh fruit cultivated on organic substrates and grown naturally in India worldwide. Using different plant parts is the easiest, most environmentally friendly, cost-effective, and sustainable way to synthesize surface-functionalized NPs of Iron and ZnO.

### Preparation methods:

Required chemicals:

All chemicals were of analytical reagent grade and used as received without further purification.  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  (99%),  $\text{Zn}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  (99.5%), UREA (99.5%), ammonia, and alcohol were purchased from Merck, Mumbai, India. NaOH and HCl were from Fisher Scientifics. Fresh leaves of the plant (Neolamarckiacadamba).

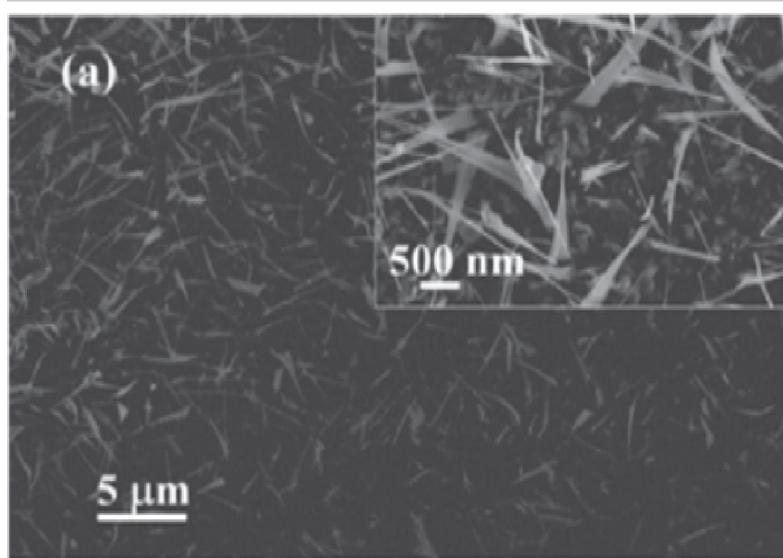
Preparation methods of Iron nanoparticles:

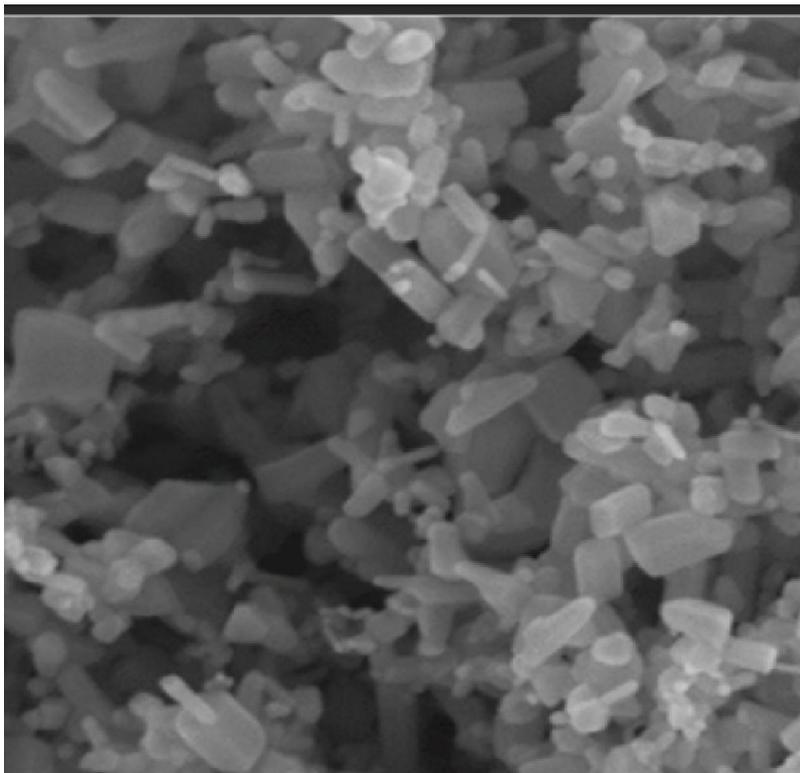
Fresh leaves of Neolamarckiacadamba are washed with water and dried in vacuum oven wave oven overnight at  $40^\circ\text{C}$  and grinded into powder. 15gm of above powder, 30ml of alcohol are added and stirred for one hour. To this 30ml of 0.01  $\text{FeCl}_3$  is added and adjusted the PH to 5.1. now the above solution is stirred for 30 minutes and filtered.

Preparation methods of ZnO nano particles:

Part I: Preparation of ZnO Solutions		
Procedure	Observations	Inference/ Comments
Add 50 mL of 0.02 M $\text{NH}_4\text{Cl}$ , 40 mL of 0.01 M $\text{ZnSO}_4$ , 5 mL of 0.01 M urea, and 5 mL of 28% w/w ammonia solution to a beaker and mix thoroughly.	Under laser light tiny particles were observed.	Indicates the slow-formation of ZnO nanoparticles.
Prepare three beakers of 10-mL aliquots of the prepared solution; each beaker will be used for different time allocations in the microwave digestion bombs.	The formation of tiny particles was increased.	Indicates the rapid formation of ZnO nanoparticles.
Clean the microscope and cover glass slides by placing into a beaker of ethanol and sonicate (5 minutes); then, use Milli-Q water and sonicate (5 minutes) before rinsing with Milli-Q water. Once glass slides have been cleaned, place into the solution in the cup. Cover and close the Parr microwave acid digestion bombs and place into the microwave.		

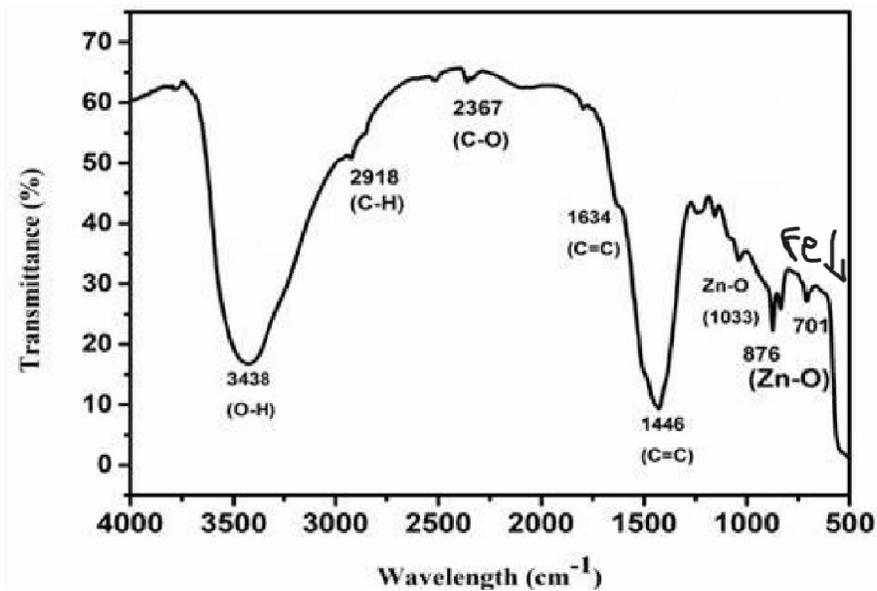
The above prepared Iron nano particle filtrate and Zn Oxide nano particles are combined and stirred on a magnetic stirrer for about one hour. Then these particles are filtered and dried in a vacuum oven. These particles were sent to IR, XRD, and SEM analysis.



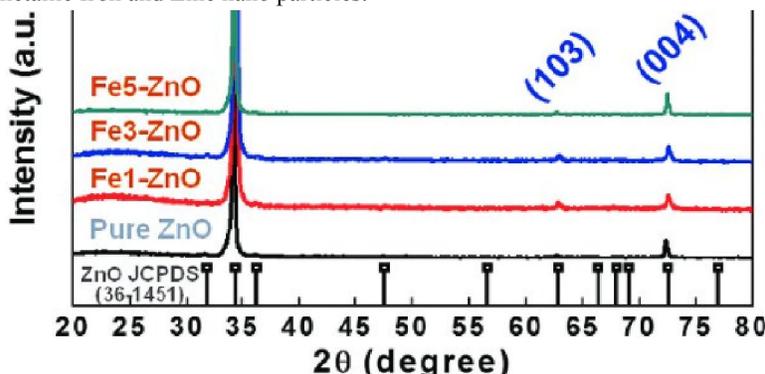


SEM Analysis of ZnO and Iron Bi metallic nano particles.

IR Spectrum of ZnO+ Fe particles



XRD spectrum of Bimetallic Iron and Zinc nano particles:



#### Applications of Bi metallic Iron and ZnONano particles:

The possible applications of iron and zinc oxide nanoparticles are diverse, such as microelectronics, photocatalysis, magnetic materials, information storage, high-density recording media, nanoelectronic, sensor technology, solar technology, hydrogen storage, and quantum machine biomedical and environmental science. Iron nanoparticles show high potential in many industrial and biomedical applications and play an important role in the aerospace industry. Iron nanoparticles with strong antiferromagnetic properties are widely used in gas sensors, pigments, and catalysts. Zinc nanoparticles have been commonly used for medical applications. Zinc NPs also used to treat a variety of other skin conditions in products, such as baby powder and barrier cream to treat diaper rashes, antidandruff shampoo, calamine cream, and antiseptic ointment.

#### II. CONCLUSION

Zinc oxide and Iron bimetallic nanoparticles (ZnO) have advantages because of its physical, chemical properties, its usage and manufacturing methods. The manufacture of this Bimetallic nano particles lead to decrease in pollution and environmental hazardous. This paper exhibits the natural synthesis of Iron nano particles and artificial synthesis of ZnO using different method. Their spectra are also in coordination with the references.

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