

Biogenic Synthesis Of Silver Nanoparticles: A Preliminary Study With *Acalypha Indica*.L. And Its Antibacterial Activity

S.Uma Subbulakshmi¹, N. Nirmal Kumar², P. Mehalingam³ & R. Mary Suja⁴

¹.Research Department of Botany V.H.N. Senthikumara Nadar College (Autonomous) Virudhunagar, - 626 001 Tamil Nadu, India.

².Research Department of Botany V.H.N. Senthikumara Nadar College (Autonomous) Virudhunagar, - 626 001 Tamil Nadu, India.

³.Research Department of Botany V.H.N. Senthikumara Nadar College (Autonomous) Virudhunagar, - 626 001 Tamil Nadu, India. 103, Karpaga Nagar, 4th Street, Selaiyur Chennai-600073.

⁴.Director William Research Centre, Nagercoil - 629001

Abstract

Antimicrobial properties of Ag are known from olden times. The plant leaf extract mediate synthesis of silver nanoparticles is gaining approval due to biological for the production of nanoparticle. In this study, simple advance was applied for biogenic of silver nanoparticles using *Acalypha indica*. L. aqueous leaf extract. The world crops having leaf of good medicinal value. In the present work, A preliminary study of silver nanoparticles were synthesized by incubating leaf aqueous extracts with silver nitrate solution. Surface Plasmon resonance bands, studied by UV-Vis spectroscopy, have been obtained. Optimization studies for the synthesis method various parameter. The functional group were analyzed by Fourier transform infra-red spectroscopy (FTIR). Its antibacterial activity was checked in preliminary stage.

Keywords: Silver, nanoparticles, *Acalypha indica*, UV-Vis spectroscopy, FTIR.

INDRODUCTION

Different techniques are used for synthesizing metallic and nonmetallic nanoparticles of different sizes and shapes such as physical and chemical techniques (John A. de Britto D Herin *et al.* 2014). Nanotechnology is a valuable research in this world. Nanotechnology has been material synthesis behaviour and applications. This study can be achieved using physical. Chemical and biological approaches. The biology contributions inspiring models and bio-assembled comments to nanotechnology (Mubark *et al.*, 2011). It is a field with great potential for countries rich in biological diversity, such as India, whose biodiversity may be used as a key resource of biotechnological products and process that are suitable for large scale synthesis (Ahamad *et al.*, 2010). The biological and green techniques for synthesis nanoparticles are nontoxic, faster than other techniques and potentially eliminate the environmental issues. These techniques are simple and less expensive and nanoparticles of different sizes and shapes can be produced in large scales (Khalid H, Abdalla *et al.*, 2015). The real value of the Nano-tubes would be in their application, whether within existing industry, or to enable the creation of a whole new one. Hence, there is scope to develop method for the synthesis of nanoparticles. which should be required in expensive reagent, less drastic reaction condition and eco-friendly (Lanje *et al.*, 2010; Yang *et al.*, 2012; Borkow *et al.* 2019). In this case study of AgNO₃ are biosynthesized using *A. indica*'s leaf extract. An overview of recent trends in synthesizing nanoparticles prepared via biological entities and their applications is given by L. Wang *et al.* (18).

Acalypha indica.L. in Euphorbiaceae family is a Annual herb plant. this plant usually available in humid conditions.

MATERIAL METHODS

2.1 Chemicals

All the reagents purchased were of analytical grade and used without any further purification. AgNO₃ was purchased from Sigma-Aldrich from India. Nutrient agar for bacterial culture and MHA broth and agar for antibacterial assay were purchased from Hi-media, of India. Distilled water was used throughout the experimentally (Johny Dathees T. Santhya Leenus S. *et al.* 2016).

2.2 Preparation of plant extract

Acalypha indica.L plant leaf were collected from VHNSN College campus virudhunagar, tamilnadu of India. The leaf thoroughly washed several times with running tap water and remove dust particles. Those new fangled plant leaf of *Acalypha indica*.L were exposed to the sun until they were plant completely dried. Then dried leaf it is powdered using grinder. After the extract was prepared by 20g of dried powder leaf in 500ml of distilled water added and kept water both for 10 mintsat 800C. Then the extract was filtered using whatman No:1 filter paper.

2.3 Synthesis of Silver Nanoparticles

AgNO₃ solution was prepared and stored in beaker. 10 ml of leaf extract was taken in beaker separately and to this 90ml of AgNO₃ solution was added. After colour change leaf extract from pale green to dark brown was checked periodically. Then 26 hours after the colour change to dark brown colour.(Johny Dathees T. Santhya Leenus S. *et al* 2105).

2.4 Antibacterial assay

Human Pathogenic bacteria namely, *Bacillus Subtilis*, *Staphylococcus aureus*, *Eschreichia coli*, *proteus mirabilis* and *Xanthomonoas oryzae*, were produced from be Gandhigram Rural Institute (Dindukal) tamilnadu of India .this organisms were maintained at 40 C on nutrient agar slants. Then 10µL of plants extracts and the synthesized silver nanoparticles are various concentration of (100 µL 150 µL 200 µL) at introduced into 6mm diameter it well. The plates were incubated in 37o C. The antibiotic (10µg) streptomycin was used as a positive control. After incubation the Zone measure at mm. the inhibition zone was assay carried out tropical. (tamilselvanet *al* 2016).

2.5 Characterization of AgNPs

Characterization of nanoparticles is important task to understand and control over nanoparticles Synthesis and application and can be done of UV-vis spectroscopy and Fourier transform infrared spectroscopy (FTIR). FTIR analysis confirmed that the bioreduction of Ag⁺ ions to silver nanoparticles is due to the reduction by capping material of plant extract. (Gole *et al.* 2001).

3. RESULTS AND DISCUSSION

The synthesized AgNPs due the color changed from dark brown color formation of AgNPs.



Figure 1: Color change of leaf extracts containing silver nitrate before *Acalypha indica*.L aqueous leaves extract and after synthesis of silver nanoparticles.

The UV- Vis report of synthesized nanoparticles was taken at the at the 360 to 480 nm wavelength due to the roughness of the peak and proper base line. The showed peaks at 430 nm revealed of AgNPsit reaction mixture. UV-vis peak was observed for AgNPs 430nm.

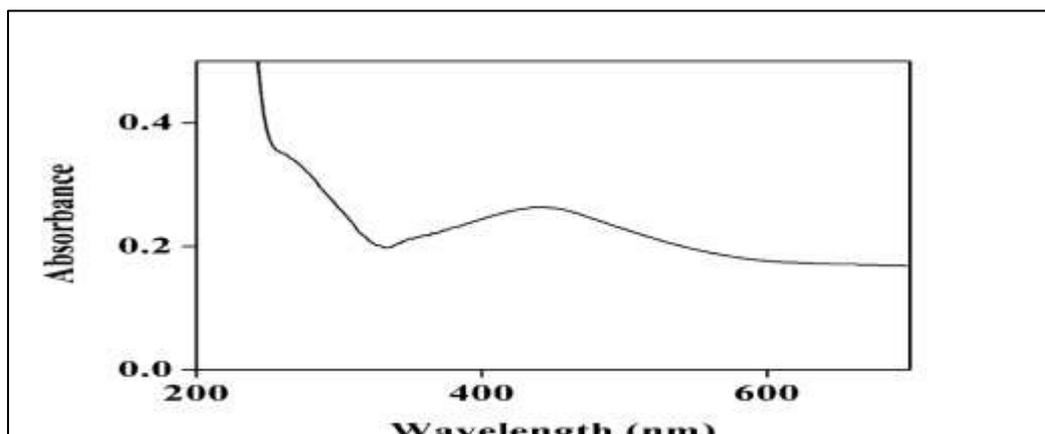


Figure 2: UV-visible spectra of synthesized AgNPs by using aqueous leaves extract of *Acalypha indica.L*. The FTIR peak Position at 2360.71 cm^{-1} to the stretching vibration of C=N group. The band at parallel to 1585.38 cm^{-1} and 2923.92 cm^{-1} N-H bonded Stretching trembling of Carboxylic acid, the band at 1383.83 cm^{-1} to N=O due the nitro groups.

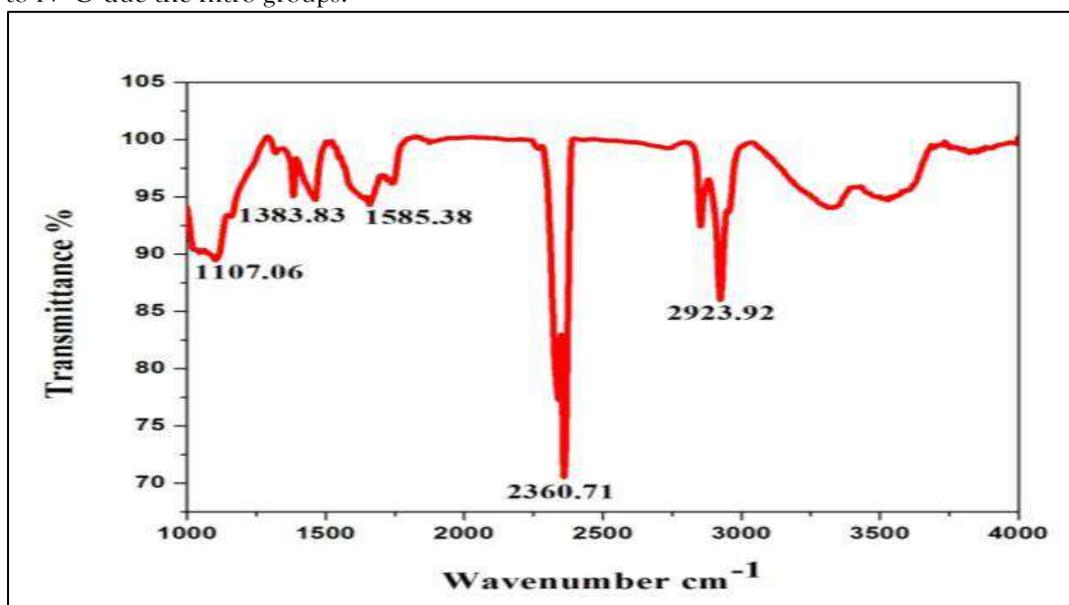


Figure 3: FT-IR spectrum of the synthesized AgNPs using the leaves extract of *Acalypha indica.L*. Antibacterial assay of Plant Extract shown Potential activity against experienced human pathogenic organism. The green way synthesized good activity against all pathogenic range.

S. no.	Microbial strain			Zone of inhibition in (mm)	
	Plant extract	AgNO ₃	100ul	Control	
1	Bacillus subtilis	24	23	22	29
2	Staphylococcus aureus	11	15	14	20
3	Escherichia coli	11	14	13	18
4	Proteus mirabilis	13	11	17	20
5	Xanthomonas oryzae	12	10	12	16

Table 1: Zone of inhibition.

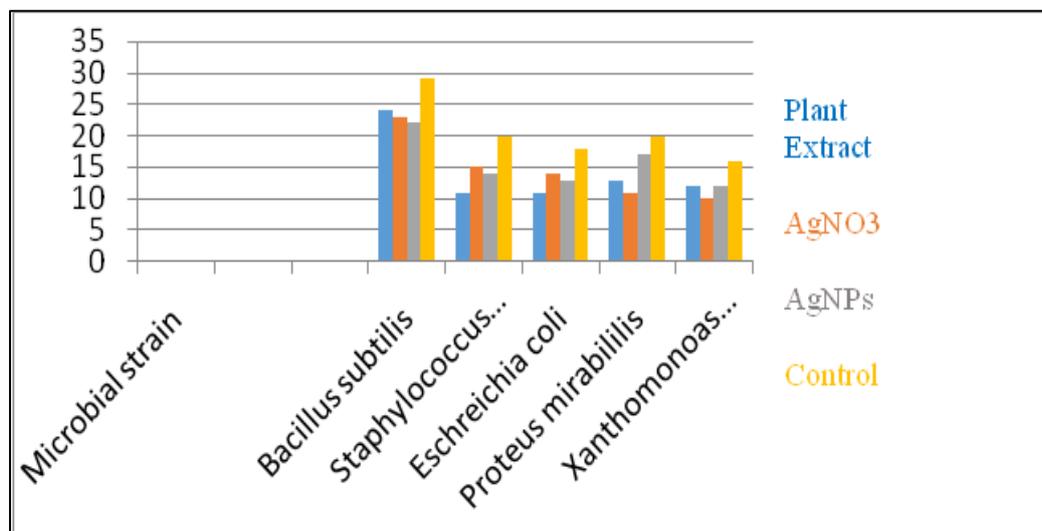


Figure 4: Graphically represent the inhibition zones of *Acalypha indica L.*

CONCLUSION

In case of study would leading to the establishment of some compounds can be used to preparation new and more potential agent of natural beginning in favour of the cure of bacterial infection beings after good in vivo studies. in the end the green synthesis silver nanoparticles eco-friendly and present at birth method

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