

Silver Nanoparticles From Five Fruit Peel On Protein And Anti-Fungal Properties

(Project Code: BSPH308)

A Review On Silver Nanoparticles from five fruit peel on protein and anti-fungal properties for the degree of

Bachelor of Science in Physics (Honours)



Submitted to:
Dr. Pawan Kumar
Assistant Professor
SBAS – Physics

Submitted by:
Ms. Vanshika Goyal
Roll No.: 1703090004
B.Sc. (H) Physics

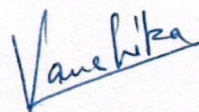


Registrar
K.R. Mangalam University
Sohna Road, Gurugram (Haryana)

**SCHOOL OF BASIC AND APPLIED SCIENCES
K. R. MANGALAM UNIVERSITY
SOHNA ROAD, GURGAON
June, 2020**

DECLARATION

I, **Vanshika Goyal**, a bonafide student of **B.Sc. (H) Physics** of **K.R. Mangalam University, Gurgaon** would like to declare that the dissertation entitled "**Silver Nanoparticals From Five Fruit Peel On Protein And Anti-Fungal Properties**" submitted by me in partial fulfillment of the requirement for the award of the degree of Bachelor of Science in Physics (Honours) is my original work.

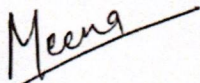


**Ms. Vanshika Goyal
Roll No.: 1703090004
B.Sc. (H) Physics**

CERTIFICATE

This is to certify that the dissertation entitled "**Silver Nanoparticles From Five Fruit Peel On Protein And Anti-Fungal Properties**" is a bonafide record of the work done by **Ms. Vanshika Goyal (Roll No. 170309004)** under my supervision and submitted to **K.R. Mangalam University** in partial fulfillment for the award of the degree of **Bachelor of Science in Physics (Honours)**.

Date:



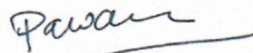
Counter Signed by-

Prof. (Dr.) Meena Bhandari

Dean, SBAS

K.R. Mangalam University

Sohna Road, Gurgaon



Supervisor-

Dr. Pawan Kumar

Assistant Professor, SBAS

K.R. Mangalam University

Sohna Road, Gurgaon

ACKNOWLEDGEMENT

A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have helped me to complete my work.

First and foremost, I would like to express my deep sense of gratitude and sincere thanks to my supervisor Dr. Pawan Kumar for his guidance, endeavour throughout the course which helped me in timely completion of this work under whose guidance this task has become reality. I am extremely grateful to him for taking pains in checking my dissertation and giving me valuable suggestions, help and encouragement, without his help it would have been indispensable to accomplish my work.

I am highly obliged to Prof. (Dr.) Meena Bhandari, Dean SBAS, for giving me this opportunity and the teaching and Lab staff of the Department for providing necessary facilities.

In no way, I am thankful to my classmates and all my friends.

Ms. Vanshika Goyal

Roll No: 1703090004

Table of Contents

S.No.	Topic	Page No.
1.	Abstract	1
2.	Introduction	2
3.	Procedure	2
4.	Result	3
5.	UV Visible Spectroscopy	4
6.	FTIR Spectroscopy	4
7.	SEM analysis of SNPS	4
8.	TEM analysis of SNPS	4
9.	Conclusion	5
10.	References	6

ABSTRACT

- ⊙ Synthesis of AgNPs through the reduction of aqueous silver nitrate (AgNO_3) by using different peel of the fruits (banana, pear, orange).
- ⊙ The synthesis of nanoparticles by pear peel and kiwi peel has been monitored by (UV-Vis).
- ⊙ The morphology of the silver nanoparticles was characterized by scanning electron microscopy (SEM) and transmission electron microscope (TEM), Fourier Transform infrared spectroscopy (FTIR), was used to key out the specific functional groups responsible for the reduction of silver nitrate to form silver nanoparticles and the capping agents present in the waste extract.
- ⊙ The stability of the silver nanoparticles was analyzed by zeta potential measurements synthesis of silver nanoparticles by pear peel and kiwi peel were negative zeta potential and it showed the stability of the silver nanoparticles.
- ⊙ The size of silver nanoparticles synthesized by pear peel and kiwi peel were ranged from 5-10 and 18-35nm by zeta size estimation.
- ⊙ These nanoparticles were found to be naturally protein coated.
- ⊙ Our results showed that the effect of different size of silver nanoparticles on growth diameter of fungal.

Introduction

- ⊙ Varieties of synthetic method has been utilized for the synthesis of silver-based nanoparticles include chemical, biochemical techniques and physical which may have adverse impacts in the medical applications.
- ⊙ Silver nanoparticles were synthesized by using biological materials have many properties like a high surface area, smaller in size and high dispersion.
- ⊙ In this study we will synthesis silver nanoparticles by using peel of five different fruits and characterization.
- ⊙ In general, biosynthesis of silver nanoparticles depends on the presence silver ions (Ag^+) and reduction of (Ag^+) by many enzymes have reducing power inside the cell cytoplasm.

Procedure

Fruit Peel

Collected different fruits peel (banana, pear, orange and kiwi).

Preparation of Peel Extract

- ⊙ Different fruits peel were washed through distilled water and cut into small pieces and then dried in oven at 70 C to 72 C.
- ⊙ Then 10g were grinded and transferred to 100ml flask containing 100ml of deionized water, mixed well and boiled for 5 min.
- ⊙ The extract was filtered through a cheese cloth to remove insoluble fractions and macromolecules, then filtered through filter paper.

Synthesis of AgNPs by using Peel Extract

- ⊙ To synthesize AgNPs, 10 ml of fruits peel extract was mixed with 100ml of aqueous solution of AgNO_3 (1mM).
- ⊙ Reduction occurs as indicated by brown color after 60 min at room temperature indicating the formation of AgNPs.
- ⊙ The 1mM silver nitrate solution without any addition of extract was used as control.

Characterization of Synthesized Silver Nanoparticles

- ⊙ The shape and size of silver nanoparticles were determined by SEM and TEM.
- ⊙ For TEM, one drop of sample was loaded on a carbon coated copper grid and it was leave to dry at room temp, the micrographs have been obtained using TEM operating at 100kV.
- ⊙ The electron diffraction pattern for a selected area was recorded.

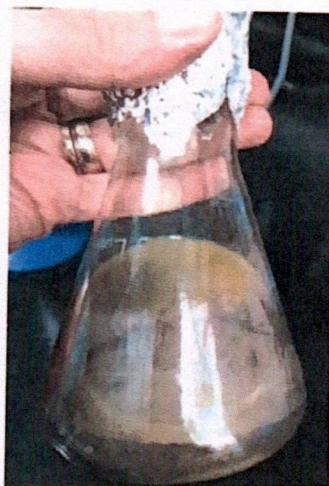
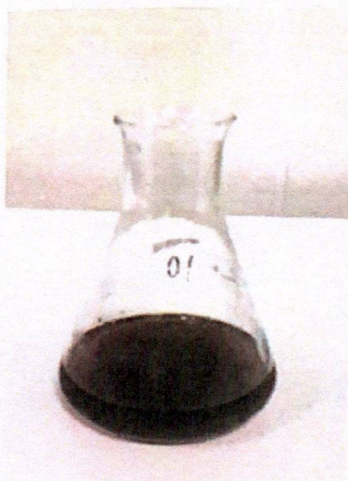
Isolation of Extracellular Proteins

- ⊙ 1g of peel plant and 5ml of deionized water were added.
- ⊙ The mixture was agitated overnight at 4 C on a shaker followed 10 min at 4 C by centrifugation at 10,000 rpm.
- ⊙ The cell-free filtrate containing the extracellular protein was analyzed by one dimensional sodium dodecyl sulfate polyacrylamide gel electrophoresis(SDS-PAGE).
- ⊙ Filtrate was boiled (95 C for 5 min)with 1% sodium dodecyl sulfate (SDS) solution for 10 min followed by centrifugation.

Result

BIOSYNTHESIS OF SILVER NANOPARTICLES:

- ⊙ After addition of AgNO_3 into peels extract, the color changed to dark brown with intensity increasing during period of time which confirms the formation of nanoparticles.
- ⊙ In figure 1, it shows the flask containing the filtrate of the peel extract in aqueous solution of 10 M-3 AgNO_3 after 24hr of reaction.
- ⊙ Deposition of silver nanoparticles on the inner surface of the flask after 2 week was appeared in fig(b).



UV-Vis Spectroscopy

- ⊙ It is a technique to check formation and stability nanoparticles which produced by fruit peel extract.
- ⊙ After 24 hours of extract addition, the color of reacting turned into light brown from colorless solution due to formation of colloidal nanoparticles.
- ⊙ The synthesis of nanoparticles by pear peel and kiwi peel has been monitored by UV-Visible spectroscopy.

FTIR Spectroscopy

- ⊙ It is useful to determine the functional groups on peels extract.
- ⊙ The broadband appearing at 3267.85 cm may assigned the participation of O-H group in the synthesis of nanoparticles.
- ⊙ These bonds might be due to the stretching of -OH in enzymes, proteins or polysaccharides present in the extract.
- ⊙ The free thiol groups present in the proteins were used for the reduction and capping silver nitrate to silver nanoparticles.

SEM analysis of SNPS

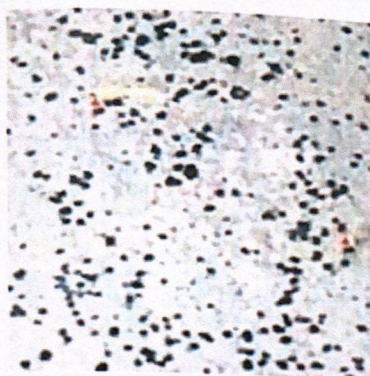
- ⊙ The surface morphology and topography of the SNPs were examined by scanning electron microscopy.
- ⊙ Well defined spherical SNPs without any agglomeration.
- ⊙ The SEM image showing the high density silver nanoparticles synthesized by the different peels extract.



TEM analysis of SNPS

- ⊙ TEM was utilized to vision the sizes and shapes of Ag nanoparticles.
- ⊙ Most of the silver nanoparticles formed were spherical, and without any agglomerated nanoparticles were observed in the fig.

- ◎ The size and the shape of the biosynthesized nanoparticles depend on the plant type.



CONCLUSION

- ◎ We have carried out production of silver nanoparticles as safe and economically viable by successfully synthesized using five fruits peel extract.
- ◎ The morphology of silver nanoparticles was characterized by SEM and TEM
- ◎ TEM and SEM were utilized to vision the sizes and shapes of Ag nanoparticles.
- ◎ Most of the nanoparticles formed were spherical, and without any agglomerated nanoparticles were observed.
- ◎ FTIR (Fourier transform infrared spectroscopy) was used to key out the specific functional groups responsible for the reduction of silver nitrate to form silver nanoparticles and the capping agents present in the waste extract.
- ◎ The stability of the silver nanoparticles was analyzed by zeta potential measurements synthesis of silver nanoparticles by pear peel and kiwi peel were negative zeta potential.
- ◎ Silver nanoparticles have a high antimicrobial activity and used for inhibition fungal growth.
- ◎ Detection of proteins capping and stability SNPs from five plants as model system.