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Green synthesis of silver Nanoparticle using *Carica Papaya* and study there Biochemical Application

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Abstract: **The nanopartical offer several advantages over other conventional drug delivery systems. Nanoparticles have gained importance in technological advancements due to their modifiable physical, chemical and biological properties with improved performance over their bulk foils. Nanoparticles can simply move in the body due to their small size and reach very complex organs through divers routes. The high stability, controlled drug release makes nanoparticles the most suitable drug delivery system. The study of different methods of synthesis of nanoparticles is essential to obtain desired nanoparticle with specific sizes and shapes. They are suitable candidates for various marketable and local application, which include imaging, catalysis medical application and environmental application.**

Keywords: **Nanopartical, bulk foil, divers routes.**

1. INTRODUCTION

It may appear that Nanotechnology is of recent origin. Actually, it dates back several thousands of years like use of gold nanoparticles in tinting of glass used to make goblets and also to cure certain diseases. This is because nanopartical have altered properties than their base metallic elements.(15) In 1875 Faraday was the first person to recognize metallic nanoparticles as unique nanostructures with distinctive properties. Various synthesis methods are adopted to for the preparation of metallic distinctive properties. Various synthesis methods are adopted to for the preparation of metallic nanoparticles. These are either top down or bottom up approach. However, each of these approaches has certain advantages and limitations. Both these methods are physic- chemical in nature.(2)

Synthesis approaches:

1. Top-down approach

The top-down approach uses initial macroscopic structures. The methods begin with larger particles which are reduced to nanoparticles after a sequence of operations performed over them. Main shortcomingof these methods are that they involve large installation and hug capital is required for set up. The methods are quite expensive and hot suitable for large-scale production. The method is suitable for laboratory experimentation. The approach is based upon the grinding of materials. These methods are not suitable for soft sample.(16,10)

Methods in Top-down approach:

1. Physical vapour deposition.
2. Chemical vapour deposition.
3. Ion implantation.

4. Electron beam lithography.
5. X-ray lithography.

2. Bottom-up approach

Bottom-up approaches of production of nanomaterials comprise the miniaturization of materials constituents to the atomic level with the additional procedure leading to the development of nanostructures. Throughout the further progression, the physical forces working at nanoscale combined simple units into larger stable structures. The methodology is principally based on the principle of molecular recognition. Self-assemblymeans growing more and more thinds about one's kind from themselves. Many of these techniques are still under developmentnor are just beginning to be used for the commercial production of nanoparticles.(8,4)

Methods in a bottom-up approach:

1. Sol-gel synthesis
2. Colloidal precipitation
3. Hydrothermal synthesis 4. Organometallic chemical route
5. Electrodeposition.

Methods of synthesis of nanoparticles

1. Physical methods

a) Mechanical method
b) Pulse laser ablation
c) Pulsed wire discharge method
d) Chemical vapor Deposition
e) Laser pyrolysis
f) Ionized cluster beam Deposition

2. Chemical methods

a) Sol-gel method
b) Sonochemical synthesis
c) Co-precipitation method
d) Inert gas condensation method
e) Hydrothermal synthesis

3. Biological methods

a) Synthesis using microorganisms
b) Synthesis using plant extracts
c) Synthesis using algae

Carica papaya

Papaya is a powerhouse of nutrients and is available throughout the year. It is a rich source of threes powerful antioxidant vitamin C, vitamin A and vitamin E. the mineral, magnesium and potassium; the B vitamin pantothenic acid and folate and fiber. In addition to akk this, it contains a digestive enzyme-papaintha effectively treats cause of trauma, allergies and sports injuries. All the nutrients of papaya as a whole improve cardiovascular system, protect against heart diseases, heart attacks,

strockes and prevent colon cancer. The fruit is an excellent source of beta carotene that prevents damage caused by free radicals that may cause some forms of cancer. It is reported that it helps in the prevention of diabetic heart disease. Papaya lowers high cholesterol levels as it is a good source of fiber. (9)

Papaya effectively treats and improve all types of digestive and abdominal disorders. It is a medicine for dyspepsia, hyperacidity, dysentery and constipation. Papaya helps in the digestion of proteins as it is a rich source of proteolytic enzymes. Even papain-a digestive enzyme found in papaya is extracted, dried as a power and used asvan aid in digestion. Ripe fruit consumed regularly helps in habitual constipation. It is also reported that papaya prevents premature aging. It may be that it works because a poor digestion does not provide e nutrients to our body. The fruit is regarded as a remedy for abdominal disorders, the skin of works as a best medicine for wounds. Even you can use the pulp left after extracting the juice from papaya as poultice on the wounds. The enzymes papain and chymopapain and antioxidant nutrients found in papaya have been found helpful in lowering inflammation and healing burns. That is why people with diseases that are worsened by inflammation, find relief as the severity of the condition reduces after taking all these nutrients.(1)

Biological sources

- Botanical name: Carica papaya
- Family name: caricaceae
- Common name: Papaya, paw paw, kates, papaw • Part used: leaves, fruits, bark.

Cosmetic benefits of papaya

Rubbing the white pulp of papaya improves pimples as well as wrinkles. Papaya works as a good bleaching agent. It is an important ingredient in bath soaps, astringents, detergent bars and hand washes. Home recipe for papaya skin lighter experts suggest that papaya can help in removing dead worn-out skin cells and replace it with healthy new cells, thereby lightening the color of our skin. For this, one can prepare a paste of raw papaya and apply it on the skin once for few days.(13)

2. METHODS

Collection and preparation of extract:

Fresh leaves of Carica papaya (pawpaw), collecting separately from a local area The plant leaves were thoroughly wash with tap water to remove dust particles and other unwanted materials accumulated on the leaves. The dust free leaves were pulverized and kept to dry under shade in the Pharmaceutics laboratory for 24 h. The dried leaves were then powdered by using an electric blender**.**

Extraction Procedure:

Fresh leaves of Carica papaya (pawpaw), collecting separately from a local area The plant leaves were thoroughly wash with tap water to remove dust particles and other unwanted materials accumulated on the leaves. Were diced into fine pices and transferred into sterile distilled water and heated at 60c for 5-10min and incubated sand bath for 30 min to facilities aqeous extract extract was filtered using filter paper and filterate extract was stored at 4c for further analysis

Synthesis of silver nanoparticles:

10 mL of 1% silver nitrate ($AgNO_3$) was prepar by dissolving 0.1 g of silver nitrate ($AgNO_3$) in 10ml of water follow by incorporation of 5 ml of the extract in drops under constant stirring using a magnetic stirrer assembly for 5 min, to obtain $[Ag]^+$dispersion. 25 mL aliquot of a freshly prepar aqueous extract of Carica papaya leaves (reducing agent) was add to the resultant mixture and maintain at 40˚C temperature for 24 h. The resultant suspension of Silver nanoparticle was lyophiliz (using Virtis 2KBTXL-75 Benchtop SLC Freeze Dryer) and subject to further analysis.

Charcterisation of Silver Nano-Composites (UV-VIS Spectroscopy):

UV-Vis spectral analysis using a double beam spectrophotometer with the samples dispers in distill water and kept in a quartz cuvette with a path length of 10 mm. The photoluminescence emission spectra from the samples (dispersed in distilled water) were record by a spectrofluorometer (LS 55, Perkin Elmer) at room temperature using a four side polish quartz cuvette with a path length of 10 mm.

Antioxidant acivity:

The antioxidant activity of C. papaya extract was determin by the method of with slight modification using the stable DPPH scavenging. Briefly, samples extract with various concentrations was prepar 30, 60, 90, 120, and 150 µg/mL. Each sample was mix with 1.0 mL of 0.4 mM DPPH solution. All the solutions were prepar with methanol to 5.0 mL. Experiment is done in triplicate. The test sample is incubat for 30 min at room temperature and the absorbance is measure at 517 nm. Ascorbic acid was use as a standard at concentration of 2, 4, 6, 8, and 10 µg/mL and DPPH in methanol was used as a control. The different in absorbance between the test and the control was calculat and the express as % scavenging of DPPH radical (% inhibitions). Then, % inhibitions were plott against respective concentration use and from the graph IC50 calculat.

Purification and Identification:

Purification is conduct using TLC preparative The ethanol extract is analyz by TLC method using silica gel GF254 with three solvents mixture:n-hexane-ethyl acetate (9:1, 4:1), ethyl acetatemethanol (3:7, 4:6), and chloroform-methanol (7:3, 6:4). The spots were visually identifi under 254 nm and 366 nm UV lamp.

Antimicrobial Diffusion Method:

The antimicrobial activity of silver nanoparticles is carried out against both Gram positive and Gram negative bacteria. The synthesiz silver nanoparticles exhibit good antibacterial activity against both Gram positive and Gram negative bacteria.

3. RESULT AND DISCUSSION

Synthesis of silver nanoparticles from carica papya leaves synthesized by adding AgNo3 solution in leaf extraction in overnight colour change was observed brown colour are formed in antimicrobial activity *S.aureus* and *E.coli* show antimicrobial activity against silver nanoparticles solution phytochemical screening of leaves extraction contain phenols, tanins, steroids, coumanins, terpanoid, flavonoids. the UV absorption of spectrophotometric analysis

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