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GREEN SYNTHESIS OF SILVER NANOPARTICLES (Ag NPs) USING BIOLOGICAL COMPONENTS: MINI REVIEW

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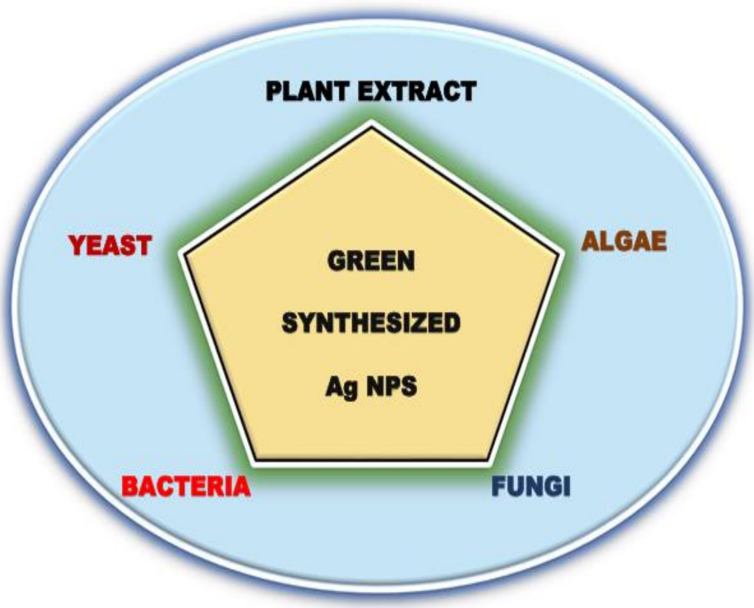
Abstract:

Nanoparticles of different elements are synthesized by physical, chemical and biological methods. Significant research has been done on the synthesis of nanoparticles of particulate size ranging from 1 to 100 nm in the recent years. Green synthesis approach of nanoparticles is very facile, eco-friendly, cost effective and nontoxic. Biological components such as microorganisms and plant extracts are widely used in green synthesis of silver nanoparticles. Silver (Ag NPs) nanoparticles can be synthesized using biomolecules of various plant parts and micro-organisms that increase rate and synthesizing stability of it. Also, these Ag nanoparticles revealed excellent biological activities against several pathogens. In this article, the green synthesis of silver nanoparticles by biological components has been discussed.

Keywords: Biological Components, Green Synthesis, Silver nanoparticles, Plant extract



Introduction:

A variety of physical and chemical techniques have been developed to synthesized nanoparticles, such as sol-gel processing, co-precipitation, microwave synthesis, micro emulsions, hydrothermal, inert gas condensation, pulsed laser ablation, spark discharge generation, chemical vapour synthesis, spray pyrolysis, flame spray pyrolysis, laser pyrolysis/photochemical synthesis, and thermal plasma synthesis[[1]. These techniques are even so, expensive, ecologically hazardous and somewhat decisive due to it requires hazardous chemical and costly physical methods [2]. Apart from this, green synthesis approach of nanoparticles supplying safer replacements by use of non-toxic, environmentally friendly solvents and mild experimental conditions [3-5]. Any element whose size is reduced to the nanometer may have changed basic properties. In view of it, a tiny element's properties might vary significantly compared to those of a macroscopic elements, thereby rendering it ideal for many different kinds of applications. Nowadays, nanoparticles are essential in chemistry, biology, medicine, agriculture and biotechnology, due to its unique size, shape, morphology and properties [6-7]. Recent developments in the field of nanoparticle synthesis have a significant influence in many research fields, and multiple approaches have been investigated such as use of plants parts, microorganisms such as algae, fungus, bacteria, and yeasts for the synthesis of silver nanoparticles [8-10]. This review purpose is describe the green synthesis of silver nanoparticles by using biological components.

Green synthesis of Silver Nanoparticles (Ag NPs)

1. From Plant Extract:

For green synthesis, plant extract are the most efficient one alternatives for synthesis of silver nanoparticles. In this method plant parts like leaves, beans, roots, bark crushed or shriveled under shade then this plant extract is simply stirred with solution of silver salt at room temperature short period to shaped silver nanoparticles [11-14].

2. From Algae:

A variety of marine algae, such as the haptophytes Isochrysis galbana, Chaetoceros calcitrans, Tetraselmis gracilis, Nannochloropsis oculata, C.

vulgaris, and Chlorella Salina, are suitable for use to synthesize silver nanoparticles. After the gathering, proper washing, air drying, and crushing of algae samples, the biomass is preserved in water for a duration of 24 to 48 hours. Lastly, a bioredution of Ag into Ag NPS occurs in the seaweed extract mixture with silver salt solution [15-18].

3. From Fungi:

Fungi like Aspergillus fumigatus, Aspergillus terreus, F. oxysporum, Aspergillus flavus, Cladosporium cladosporioides, Penicillium fellutanum, fellutanum, Fusarium oxysporum and many more have ability to synthesized AgNPs. Fungi mycelium was kept in Ag salt solution which release metabolite and enzymes that have binding ability, intracellular uptake acceptance to produce AgNPs.[19-22].

4. From Bacteria:

From bacterial mode of synthesis such as intracellular and extracellular, silver nanoparticles synthesized by protein or soluble secreted enzymes present on either intracellular (Corynebacterium sp , Proteus mirablis and Vibrio alginolyticus, y Bacillus sp.) or extracellular (Aeromonas sp., Bacillus licheniformis, Bacillus pumilus, Bacillus persicus) bacteria cell wall act as reducing agent reduces Ag+ ion to Ag0 ion [23-26].

5. From Yeast:

Silver nanoparticles can be synthesized by using extremophilic yeast strain which includes partially degraded proteins, nucleic acids and peptides. In this method isolation of silver tolerant yeast strain by protecting with aqueous solution of silver nitrate gives rise to Ag NPs [27-29].

Conclusion

For the recent past, significant effort has been made to synthesized new green synthesis methods and utilization biological components have this potential. The present study synthesized silver nanoparticles (Ag-NPs) using green approach means its usefulness in several fields. Green synthesis of silver nanoparticles have been attracted a lot of interest in research area due its distinct chemical, physical, biological characteristics and applicability. This procedure is simpler, ecofriendly, cost effective and non-toxic. Silver nanoparticles have several uses in an extensive variety of biological fields.

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Declaration:

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Ethical approval: This has not been published elsewhere and is not currently under consideration for publication elsewhere.

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