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Silver Nanoparticles – Properties, Synthesis & Applications

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Short Commentary

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ABSTRACT

Nanomedicine is an emerging field of science which uses the applications of nanotechnology in the prevention and treatment of diseases in human body.

Nanosize is one-billionth of a meter i.e. 10-9. It involves scientists from different fields including physicists, chemists, engineers and biologists.

Silver nanoparticles (Ag-NPs) are now widely studied nanoparticles due to their antimicrobial and antiviral activities and their uses consumer products including electronics, paint, clothing, food and medical devices.

The diverse applications of silver nanoparticles is due to their characteristic properties of magnetic and optical polarization, catalysis, electrical conductivity, antimicrobial properties, DNA sequencing and surface-enhanced Raman scattering

INTRODUCTION

Nanomedicine is an emerging field of science which uses the applications of nanotechnology in the prevention and treatment of diseases in human body [1]. Nanosize is one-billionth of a meter i.e. 10-9 [2]. It involves scientists from different fields including physicists, chemists, engineers and biologists [3]. Nanoparticles made of metals like that of gold and silver have gained importance due to their applications in the fields of electronics, material sciences and medicines [4-6].

Silver nanoparticles (Ag-NPs) are now widely studied nanoparticles due to their antimicrobial and antiviral activities and their uses consumer products including electronics, paint, clothing, food and medical devices [7].

The diverse applications of silver nanoparticles is due to their characteristic properties of magnetic and optical polarization, catalysis, electrical conductivity, antimicrobial properties, DNA sequencing and surface-enhanced Raman scattering [8]

TYPES OF SILVER NANOPARTICLES

- Silver colloids [9]
- Nanoxact
- OECD-silver
- Custom silver
- Silver nanoparticles

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SYNTHESIS OF SILVER NANOPARTICLES

Several techniques are employed in the synthesis of silver nanoparticles

1. Phyto assisted synthesis of silver nanoparticles: Usage of plants for the synthesis of silver nanoparticles is gaining importance to reduce the toxic effects caused due to physical and chemical agents used for their synthesis [10-14]
2. Silver nanoparticles are also synthesized from bacteria, fungi and yeast [15-16]
3. Silver nanoparticles are also synthesized using fruit juices as reducing and capping agents [17]

CHARACTERIZATION OF SILVER NANOPARTICLES

There are various characterization techniques of silver nanoparticles [18]
UV-Vis spectroscopy analysis
FTIR analysis of Ag-NPs
XRD measurement
SEM analysis of Ag-NPs
TEM analysis of Ag-NPs

APPLICATIONS OF SILVER NANOPARTICLES IN VARIOUS AREAS OF SCIENCES

Use of silver nanoparticles in the treatment of HIV/Aids is a tremendous achievement in the field of medical sciences [19]
Building materials with silver nanoparticles with Antifungal Efficacy helps in preventing biocorrosion of construction materials is caused by bacteria and microscopic fungi [20]
Silver Nanoparticles enriched with antimicrobial efficiency are used against many drug resistant strains [21-24]
Silver nanoparticles are also employed in many enzymatic reactions such as between Horseradish Peroxidase and 3,3',5,5'-Tetramethylbenzidine [25]

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