

An Introduction to Nanotechnology and Nanoparticles

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Received: July 08, 2020; **Accepted:** July 23, 2020; **Published:** July 31, 2020

Abstract

In today's science, nanotechnology is a great field for researchers. Nanotechnology is a modern field of science that performs a useful role in the day to day life aspects. Nanotechnology deals with production, manipulation, and the use of material ranging in nanometers. Amongst all the nanoparticles synthesized; silver nanoparticles attained a particular place within the area of nanotechnology due to their antimicrobial and biomedical applications. Silver nanoparticles have a world-wide advantage because of their unusual physical and chemical characteristics especially to antimicrobial actions plus being non-toxic and environmentally safe.

Keywords: *Nanotechnology; Nanoparticles; Antimicrobial; Nanomedicine*

Introduction

Nanotechnology is a modern field of science that plays a dominant role within the day to day life aspects. Nanotechnology deals with production, manipulation, and the use of material ranging in nanometers. Due to swift industrialization and urbanization, our surroundings are undergoing huge smash-up and an outsized amount of perilous and superfluous chemical, gases or substances are released, and so now it is our need to learn about the secrets that are present in nature and its products which leads to the growth of advancements in the synthesis processes of nanoparticles. Nanotechnology applications are highly suitable for biological molecules, due to their exclusive properties. Nano-science is based on the manipulation of individual atoms and/or molecules to provide materials from them for functioning well below the sub-microscopic level. The nanoparticles exhibit completely new or improved properties based on specific characteristics such as size, distribution, and morphology [1]. The field of nanotechnology is one of the upcoming areas of research within the modern field of material science. Novel applications of nanoparticles and nanomaterials are emerging rapidly in various fields.

Nanotechnology is emerging as a rapidly growing field with its application in science and technologies for the purpose of manufacturing new materials at the nanoscale level [2]. Lately, biosynthetic processes employing either biological microorganisms like bacteria and fungus or plant extract have emerged as an easy and viable option to more compact chemical synthetic procedures to get nanomaterials [3-5]. Different types of nanoparticles like copper, zinc, titanium, magnesium, gold, alginate, and silver have

Citation: Sharma K. An Introduction to Nanotechnology and Nanoparticles. *Biotechnol Ind J.* 2020;16(2):206.

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come up but silver nanoparticles have proved to be best as it has good antimicrobial efficacy against bacteria, viruses, and other eukaryotic organisms. Of these silver nanoparticles are performing a significant role within the scope of nanotechnology and nanomedicine.

Nano-crystalline silver particles have been found tremendous applications in the fields of high sensitivity biomolecular detection, diagnostics, antimicrobials, therapeutics, catalysis, and micro-electronics. However, there's still a requirement for economic commercially viable also as an environmentally clean synthesis route to synthesize the silver nanoparticles. Silver is well known for possessing an inhibitory impact on many bacterial strains and microorganisms generally present in medical and industrial processes. Silver nanoparticles among various metal nanoparticles have gained important consideration because they're powerful antimicrobial agents that shows low toxicity, and have diverse *in vitro* and *in vivo* applications. Among nanomaterials, silver nanoparticles play an important role in the field of biology and medicine due to their physiochemical attractive properties. Silver nanoparticles are reported to possess anti-fungal, anti-inflammatory, anti-viral, anti-angiogenesis, and antiplatelet activity. In medicines, silver and silver nanoparticles have an application of skin ointments and creams containing silver to prevent infection of burns and open wounds, medical devices, and implants prepared with silver-impregnated polymers [6]. In textile production, silver-embedded fabrics are now utilized in sporting equipment [7]. Several medicines are available within the market supported silver like silver sulphadiazine, etc. for the treatment of burn and the chronic wound infected with microbes. Silver nano gels/sprays are also worth mention for their effectiveness in cosmetic and drug industries for medical goals. Although there are some ways available for the synthesis of silver nanoparticles including chemical, physical, electrochemical, irradiative, photochemical, and biological methods.

REFERENCES

1. Bouchet VR, Xin TZ, Gunasagaran S, et al. Biosynthesis of silver nanoparticles using mangosteen leaf extract and evaluation of their antimicrobial activities. *J Saudi Chem Soc.* 2011;15(2):113-20.
2. Albrecht MA, Evans CW, Raston CL. Green chemistry and the health implications of nanoparticles. *Green Chem.* 2006;8(5):417-32.
3. Joerger R, Klaus T, Granqvist CG. Biologically produced silver-carbon composite materials for optically functional thin-film coatings. *Adv Mat.* 2000;12(6):407-9.
4. Shankar SS, Ahmad A, Sastry M. Geranium leaf assisted biosynthesis of silver nanoparticles. *Biotechnol Prog.* 2003;19(6):1627-31.
5. Gardea-Torresdey JL, Gomez E, Peralta-Videa JR, et al. Alfalfa sprouts: a natural synthesis for the synthesis of silver nanoparticles. *Langmuir.* 2003;19:1357-61.
6. Durán N, Marcato PD, Alves OL, et al. Mechanistic aspects of biosynthesis of silver nanoparticles by several *Fusarium exospor* strains. *J Nanobiotechnol.* 2005;3(1):8-14.
7. Klaus T, Joerger R, Olsson E, et al. Silverbased crystalline nanoparticles, microbially fabricated. *Proc Natl Acad Sci.* 1999;96(24):13611-4.