International Journal of
Recent Innovations in Medicine and Clinical Research
Open Access, Peer Reviewed, Abstracted and Indexed Journal

ISSN: 2582-1075
https://ijrimcr.com/
Volume-2, Issue-1, 2020: 59-62

Silver Nano Particles and their Applications: Review on Members of Meliaceae

Anitha S[1*], Lakshmi Priya M[2].

Author Affiliations
[1]Dr. Anitha S, Department of Biotechnology, Sri Krishnadevaraya University, Anantapur-515 003, Andhra Pradesh, India
[2]Research Scholar, Department of Biotechnology, Sri Krishnadevaraya University, Anantapur-515 003, Andhra Pradesh, India
[*]Corresponding Author Email: anithasku@gmail.com

Received: February 9, 2020 **Accepted:** March 13, 2020 **Published:** March 28, 2020

Abstract: Nanotechnology is one of the fascinating branches of science with many applications. In this field synthesis of Silver nanoparticles (AgNPs) are having wider range of applications regarding Metal based nanoparticles. Silver itself is having antimicrobial effect and when it is combined with the Plant extract form Green nanoparticles. Scientists are using these nanoparticles in multidisciplinary fields such as medicinal, industrial and environmental purposes. The present review gives information of the synthesis and applications of the Meliaceae members. The present paper covers all the research done till now and can help the research community to take further studies.
Keywords: Silver nanoparticles, antimicrobial effect, Plant extract.

Introduction

Nanotechnology is an advanced field of science that make use of nano particles (0.1-100nm) with unique physical and chemical characteristics. Oberdorster et al. [1] stressed the need to know the risk and benefits about the Nanoparticles application. Hasan [2] has published a review on the nanoparticle synthesis and their types. Nanoparticles (NPs) can be of various types like Carbon based, Ceramic type, Polymers, Semiconductors, Lipid based and metals [3]. Carbon based are Fullerenes and carbon nanotubes [4, 5]. Ceramic NPs are inorganic solids [6], while semiconductor NPs are between metal and non-metals [7, 8]. Polymeric NPs are organic based ones [9, 10]. Lipid moieties comes under lipid based NPs [11, 12]. Metal type are purely of metals like copper, silver and gold. Metal type and size of the particles influences the properties of these nano particles [13]. Silver nano particles (AgNPs) are having, unique features like high surface to volume ratio, electrical conductivity, optical and thermal properties, when compared with different types of NPs and other metals, so they are widely used in medical field [14, 15]. Kim et al. [15] undertaken a case study to know about the risk evaluation of silver nanoparticle when exposed from antibacterial sprays. Because of wide range of application of AgNPs, risk evaluation studies are must. They finally concluded that AgNPs are having lower risk to no risk levels. Therefore they are now used in a number of consumer products [15, 16].

Inhibitory effect of Silver on microorganisms was also stressed by [17, 18]. Morones et al. [17] reported that silver nanoparticles can anchor and penetrate into gram negative cell wall which then leads to increased cell permeability and cell death. This nature of silver is due to the free radical formation [19]. Regarding the synthesis of AgNPs was present by Iravani et al. [20]. In present paper a review is present regarding the synthesis and applications of Meliaceae members. Khan et al. [21] for the first time reported Silver nanoparticle synthesis using *Azadirachta indica*, leaf extract. For the

characterization of these particles they have used UV-Visible spectroscopy, selected area electron diffraction (SAED) and Transmission electron microscopy.

Kathiravan et al. [22] reported silver nanoparticles synthesis using *Melia dubia* leaf extract and tested against in vitro cancer cell lines. Joany et al. [23] reported AgNPs synthesis using Neem leaf extract. They have characterised these particles using UV-Visible spectroscopy, SEM (Scanning Electron Microscopy), EDAX or EDX (Energy-dispersive X-ray spectroscopy) and Fluorescence spectroscopy. They have reported the particle size as 43.23nm.

Sajeshkumar et al. [24] reported the synthesis of silver nanoparticles using *A. indica* leaf extract and its antibacterial activity. These researchers used UV-Vis spectroscopy, SEM-EDX for the characterization of developed 146nm AgNPs. They have used *Klebsiella* species and *Escherichia coli* (2 gram negative bacteria and *Bacillus* species, *Micrococcus* species and *Staphylococcus* species (3 gram positive) bacteria for their study and reported antimicrobial activity.

Ahmed et al. [25] developed AgNPs using *A. indica* with aqueous leaf extract. They used UV-Visible spectrophotometer, TEM (Transmission electron microscopy) to identify the size shape and morphology of nanoparticles. Performed DLS (dynamic light scattering) for size measurement of synthesized AgNPs and found to be 34nm. Later used FTIR (Fourier transform Infrared spectroscopy) analysis for confirming the dual role of plant extract as a capping agent and reducing agent. They have tested these nanoparticles for antimicrobial activity using *S. aureus* and *E. coli* and found to have the ability of antimicrobial nature.

Mehmood et al. [26] used *Melia azedarach* leaf extract for synthesizing the AgNPs and Characterized using SEM, EDX and UV-Visible spectroscopy. They reported the particle size as 34-48 nm with more antibacterial activity against *E. coli*, *Klebsiella pneumonia* than *S. aureus, Pseudomonas aeruginosa* and *Proteus spp.* Jebarubi et al. [27] reported the synthesis of AgNPs using *M. azedarach* leaf extract and characterized these using FT-IR, X-RD and SEM analysis. They have reported 2-20 μm silver particle size.

Conflict of Interest

The authors have no conflicts of interest to declare.

References

1. Oberdörster G, Oberdörster E, Oberdörster J. Nanotoxicology: an emerging discipline evolving from studies of ultrafine particles. Environ Health Perspect. 2005;113(7):823-39.
2. Hasan S. A review on nanoparticles: their synthesis and types. Res J Recent Sci. 2015;2277:2502.
3. Khan I, Saeed K, Khan I. Nanoparticles: Properties, applications and toxicities. Arab J Chem. 2019;12(7):908-31.
4. Mabena LF, Sinha Ray S, Mhlanga SD, Coville NJ. Nitrogen-doped carbon nanotubes as a metal catalyst support. Appl Nanosci. 2011;1(2):67-77.
5. Saeed K, Khan I. Preparation and properties of single-walled carbon nanotubes/poly (butylene terephthalate) nanocomposites. Iran Polymer J. 2014;23(1):53-8.
6. Sigmund W, Yuh J, Park H, Maneeratana V, Pyrgiotakis G, Daga A, Taylor J, Nino JC. Processing and structure relationships in electrospinning of ceramic fiber systems. J Am Ceramic Soc. 2006;89(2):395-407.
7. Hisatomi T, Kubota J, Domen K. Recent advances in semiconductors for photocatalytic and photoelectrochemical water splitting. Chem Soc Rev. 2014;43(22):7520-35.

8. Ali S, Khan I, Khan SA, Sohail M, Ahmed R, Rehman A, Ansari MS, Morsy MA. Electrocatalytic performance of Ni@ Pt core–shell nanoparticles supported on carbon nanotubes for methanol oxidation reaction. J Electroanal Chem. 2017;795:17-25.
9. Rao JP, Geckeler KE. Polymer nanoparticles: Preparation techniques and size-control parameters. Prog Polymer Sci. 2011;36(7):887-913.
10. Mansha M, Khan I, Ullah N, Qurashi A. Synthesis, characterization and visible-light-driven photoelectrochemical hydrogen evolution reaction of carbazole-containing conjugated polymers. Int J Hydro Ener. 2017;42(16):10952-61.
11. Puri A, Loomis K, Smith B, Lee JH, Yavlovich A, Heldman E, Blumenthal R. Lipid-based nanoparticles as pharmaceutical drug carriers: from concepts to clinic. Crit Rev Ther Drug Car Syst. 2009;26(6):523-580.
12. Rawat MK, Jain A, Singh S. Studies on binary lipid matrix based solid lipid nanoparticles of repaglinide: in vitro and in vivo evaluation. J Pharma Sci. 2011;100(6):2366-78.
13. Dreaden EC, Alkilany AM, Huang X, Murphy CJ, El-Sayed MA. The golden age: gold nanoparticles for biomedicine. Chem Soc Rev. 2012;41(7):2740-79.
14. Lee JE, Lee N, Kim T, Kim J, Hyeon T. Multifunctional mesoporous silica nanocomposite nanoparticles for theranostic applications. Acc Chem Res. 2011;44(10):893-902.
15. Kim E, Lee JH, Kim JK, Lee GH, Ahn K, Park JD, Yu IJ. Case study on risk evaluation of silver nanoparticle exposure from antibacterial sprays containing silver nanoparticles. J Nanomat. 2015;2015;346586.
16. Benn T, Cavanagh B, Hristovski K, Posner JD, Westerhoff P. The release of nanosilver from consumer products used in the home. J Environ Quality. 2010;39(6):1875-82.
17. Morones JR, Elechiguerra JL, Camacho A, Holt K, Kouri JB, Ramírez JT, Yacaman MJ. The bactericidal effect of silver nanoparticles. Nanotech. 2005;16(10):2346-53.
18. Lok CN, Ho CM, Chen R, He QY, Yu WY, Sun H, Tam PK, Chiu JF, Che CM. Proteomic analysis of the mode of antibacterial action of silver nanoparticles. J Prot Res. 2006;5(4):916-24.
19. Kim JS, Kuk E, Yu KN, Kim JH, Park SJ, Lee HJ, Kim SH, Park YK, Park YH, Hwang CY, Kim YK. Antimicrobial effects of silver nanoparticles. Nanomed: Nanotech Biol Med. 2007;3(1):95-101.
20. Iravani S, Korbekandi H, Mirmohammadi SV, Zolfaghari B. Synthesis of silver nanoparticles: chemical, physical and biological methods. Res Pharma Sci. 2014;9(6):385.
21. Khan Z, Hussain JI, Hashmi AA. Shape-directing role of cetyltrimethylammonium bromide in the green synthesis of Ag-nanoparticles using Neem (*Azadirachta indica*) leaf extract. Colloid Surf B: Biointer. 2012;95:229-34.
22. Kathiravan V, Ravi S, Ashokkumar S. Synthesis of silver nanoparticles from *Melia dubia* leaf extract and their in vitro anticancer activity. Spectrochim Acta A Mol Biomol Spectrosc. 2014;130:116-21.
23. Joany RM, Shanthy P, Mary AC, Jeyasundari J. Synthesis of silver nanoparticles using Neem extract. Int J Nano Corr Sci Engg 2015;2(2):1-6.
24. Sajeshkumar NK, Vazhacharickal PJ, Mathew JJ, Joy J. Synthesis of silver nanoparticles from Neem leaf (*Azadirachta indica*) extract and its antibacterial activity. CIB Tech J Biotech. 2015;4(2):20-31.
25. Ahmed S, Saifullah, Ahmad M, Swami BL, Ikram S. Green synthesis of silver nanoparticles using Azadirachta indica aqueous leaf extract. J Radiat Res Appl Sci. 2016;9(1):1-7.

26. Mehmood A, Murtaza G, Bhatti TM, Kausar R. Phyto-mediated synthesis of silver nanoparticles from *Melia azedarach* L. leaf extract: characterization and antibacterial activity. Arab J Chem. 2017;10:S3048-53.

27. Jebarubi E, Christopher PKS, Raj LS. Eco-friendly synthesis of Silver mediated Nanoparticles using the leaf extracts of *Melia azedarach* L. Proceed Nat Conf Clim Change Sust Environ. 2018;60-63.

Citation: Anitha S, Lakshmi Priya M. Silver Nano Particles and their Applications: Review on Members of Meliaceae. Int J Rec Innov Med Clin Res. 2020;2(1):59-62.