

A Mini Researchon Eco-Friendly Synthesized Nanoparticles and its Applications

Deepthi Pula, R Puviarasi

Abstract: Nanotechnology is emerging technology with its applications in the respective fields. To clear the demands of energy and power there is a need to develop energy systems. This review has details about biological synthesis of nanoparticles and applications. Organic synthesis of nanoparticles may be done using micro organisms or plant extract. Organic synthesis of nanoparticles corresponds to less cost and low toxic in nature. A reducing agent is added to the extract for organic synthesis of nanoparticles. The synthesized particles are sent for many characterization techniques to know shape, size and stability. Nano particles have many applications in their respective fields. Nanotechnology is used in biological and medical fields, agriculture, electronics and chemical fields.

Key words: Green synthesis, plant extract, nanoparticles, applications of nanoparticles.

I. INTRODUCTION

As a whole review it is known that metal oxide nanoparticles have their own priority in science and innovation because of their chemical and physical properties. (1,2). Biological synthesis of nanoparticles have many advantages like they are not harmful and toxic to nature. Organic synthesis of nanoparticles can be done with plant extract (3), micro organisms (4), moulds or yeast (5) and isozymes (6). There is necessary to learn the technologies and confidential things and need to implement in concoction of organic nanoparticles. Organic method is mostly preferred for concoction of nanoparticles due to its low cost and non toxic nature. Organic synthesis may be done by plant extract or from micro organisms like yeast and bacteria.

II. GREEN SYNTHESIS OF NANOPARTICLES:

Tin oxide (SnO_2 Np's)

Organic concoction of tin oxide nanoparticles is done by Persia Americana seed methanolic extract by calcining stannous chloride precursors. This synthesized under temperature 300–500 °C. 80ml of stannous chloride solution and methanolic extract of Avocado are heated at 60°C continuously. The synthesized particles are subjected to many techniques like XRD, SEM and EDAX. SnO_2 nanoparticles synthesized by Persia Americana seed methanolic extract are non toxic and less cost. One of the important application by this synthesis is degrading toxic organic dyes (phenol red). SnO_2 NPs was in the size of 4 nm in range. (7).

Silver (Ag Np's)

Silver nanoparticles have intensive research owing to their wide applications many areas. Silver nanoparticles exhibit improved properties based on the shape, size and stability. Silver nanoparticles are synthesized by using carob plant extract. In the process of synthesis reduction of Ag^+ ions to Ag^0 nanoparticles from silver nitrate solution within 2 min of reaction time at ambient temperature is done. By the completion of this process the solution becomes black. This mixture is centrifuged and washed with distilled water and ethanol. Synthesized nanoparticles are sent for characterization techniques like XRD, UV–vis spectroscopy, SEM. The techniques states that nanoparticles are of size 5 to 40 nm with an average size as 18 nm. (8) By this synthesis antibacterial activity of biologically synthesized silver nanoparticles was evaluated against E. Coli pathogen. (9)

Iron (Fe Np's)

Green synthesis of iron nanoparticles can be done by various tea extracts. This has been recently proposed to reduce cost and environmental friendly. Organic synthesis is preferred instead of physical and chemical methods to make non toxic to nature. (10,11,12) Organic synthesis of iron nanoparticles by tea extracts used for degrading bromothymol blue by Fenton oxidation. The initial concentrations of tea extracts are prepared by heating them at room temperature. These extracts are vacuum filtered and FeSO_4 solution is added to the extract. The stock solution further obtained was diluted using deionized water. The synthesized nanoparticles were characterized through UV-vis, SEM, EDS, BET-N₂ and XRD techniques.

Titanium dioxide (TiO_2 Np's)

Among many metal oxide nanoparticles titanium dioxide nanoparticles have wide application in air and water purification due to their potential oxidation strength, stability, nontoxic. Titanium nanoparticles have some specific properties such as optical, catalytic photo catalyst, photo stability which involves in the industrial application like pigments and filters. (13,14) Titanium nanoparticles are synthesized from titanium isopropoxide solution using nyctanthes leaves extract. The synthesized nanoparticles are subjected to many characterization techniques such as XRD, SEM, PSA. Titanium dioxide nanoparticle ranges from 100 to 150 nm.

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Deepthi Pula, ECE dept, Saveetha school of engineering, SIMATS, Chennai, Tamilnadu, India.

R Puviarasi, Assistant professor, ECE dept, Saveetha School of Engineering, SIMATS, Chennai, Tamilnadu, India.

III. CHARACTERIZATION TECHIQUES

After the synthesis of nanoparticles, to confirm the detailed review on size, shape, stability and properties of particle, particle is gone through various characterization techniques. The common techniques in characterization techniques of nanoparticles are UV Vis absorption spectroscopy, X-ray diffraction, energy dispersive X-ray analysis, scanning electron microscopy and transmission electron microscopy etc.,

UV Vis absorption spectroscopy is used to check how much big it is and to know external form of nanoparticle in water combined solution. (15) X-ray diffraction gives the status about similarities of a particle, size and appearance confirmation of metallic nanoparticles (16). Scanning electron microscope is one of the characterization technique which produces images of sample by scanning the phase of particles.

IV. APPLICATIONS OF NANOPARTICLES & RESULTS

In the past few there is a dramatic increase in the publication of nanotechnology. Organic engineering which refers to the formation of organic nanoparticles and these products are used in many fields for their development. Green synthesis of nanoparticles have their effective use in healing, therapeutic applications and analysis applications (17, 18, 19, 20).

Nanoparticles have many applications in biomedical field such as imaging and drug delivery. Organic synthesis nanoparticles are used to remove pollutants in nature. Nanoparticles are used in industries to protect wood, plastic and textiles. Nanoparticles have many commercial applications. Nanoparticles have different applications with respect to the type of nanoparticle used.

V. CONCLUSION

Organic synthesis of nanoparticles have move out of as a preferable technology among all the technologies. Green synthesis of nanoparticles increases economic viability and property management. Biological synthesis of nanoparticles are inexpensive and free from chemical products for their usage in biological applications. Biological methods do not need any chemical substances. The waste of plants or fruits are non toxic and can be easily disposed. Nanoparticles synthesized by organic method have more firmness than compared with the nanoparticles synthesized from physical or chemical methods. There are huge applications using organic synthesized nanoparticles as discussed.

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