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A REVIEW PAPER ON GREEN NANOBIOTECHNOLOGY

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Abstract

Due to its ability to modulate metals into their nano scale, which effectively changes their chemical, physical, and optical properties, nanobiotechnology is gaining tremendous impetus in this period. Therefore, significant attention is given to the creation of novel strategies using biological sources for the synthesis of different types of nanoparticles of unique composition and scale. Most of the methods currently available, however, are costly, environmentally damaging and inefficient in terms of materials and energy usage.The quality and quantity of the synthesised nanoparticles and their characterization and applications are greatly influenced by several factors, such as the method used for synthesis, pH, temperature, strain, time, particle size, pore size, environment, and proximity. In addition, for their potential use in various drug delivery and biomedical applications, characterization of synthesised nanoparticles is important. The present review highlights the different parameters that influence the synthesis of nanoparticles by means of green nanobiotechnology and the various techniques used to classify nanoparticles for their potential use in biomedical and environmental applications.

Keywords: *Biomedical, Environment, Nanoparticles, Physical, Temperature, Nanobiotechnology*

I. INTRODUCTION

For a wide range of products, the synthesis of nanoparticles using modern techniques has emerged as an important application in the field of biomedical and human health care. In general, through a combination of engineering, chemical, and biological approaches, nanotechnology can be characterized as material manipulation at the atomic level. The modern notion of nanotechnology, now considered to be the most widely studied discipline of science, has a history dating back to the ninth century, when Mesopotamian craftsmen used gold and silver nanoparticles to create a glittering effect on pots and other utensils.However,

in his famous paper "Experimental Relations of Gold and Other Metals to Light," Michael Faraday presented the first scientific explanation of nanoparticle properties. Richard Feynman used the word 'nanotechnology' in 1959 for the first time, which is considered to mark the beginning of modern nanotechnology[1].

Numerous attempts are being made around the world to develop eco-friendly technologies using green nanotechnology and biotechnological techniques to manufacture environmentally friendly, non-toxic products. There are various natures of nanoparticles synthesized using biological methods or green technology, with greater stability and suitable measurements as they are synthesized using a one-step process.By enabling the synthesis to continue at physiological temperatures, pH, strain, and, at the same time, at a negligible expense, various undesirable processing conditions are thus removed. In order to describe the potential for application of synthesized nanoparticles for use in drug delivery and biomedical fields, detailed characterization techniques may therefore be used[2].

To date, no detailed investigations of the factors influencing the synthesis, characterization or study of different types of nanoparticles using green technology have been published. This analysis was therefore carried out to highlight the factors affecting the synthesis of nanoparticles using green technology and various nanoparticle characterization techniques to provide a better understanding of nanoparticles and thus increase their use in modern technology[3].

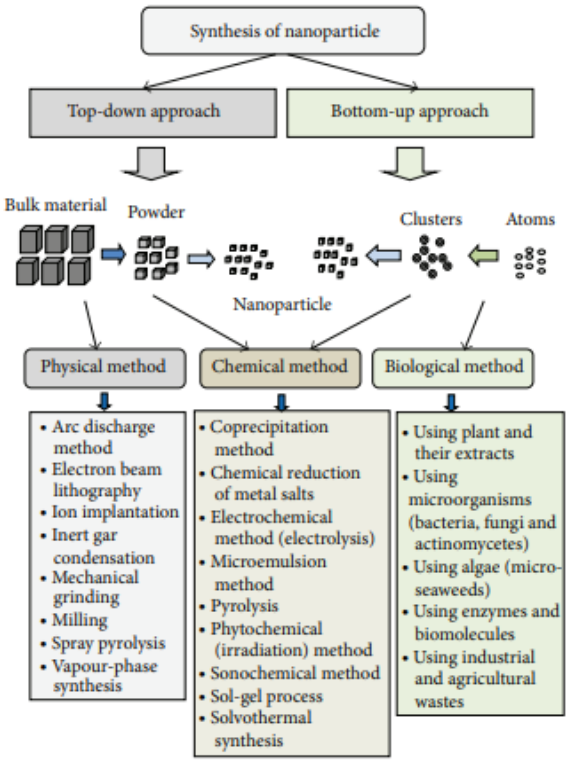

Figure 1: Depicts the diverse approaches and methods for synthesizing nanoparticles[4]

Nanoparticles can be synthesized using a number of techniques, including physical, chemical, and biological and hybrid techniques (Figure 1). Via traditional physical and chemical

processes, the processing of nanoparticles results in toxic by-products that are environmental hazards. Additionally, because of health-related problems, especially in clinical fields, these particles cannot be used in medicine.Conventional methods can be used in a shorter period of time to generate large quantities of nanoparticles with specified sizes and shapes; however, these techniques are difficult, expensive, ineffective, and outdated. The interest in the synthesis of environmentally friendly nanoparticles, which do not produce hazardous waste products during the development process, has been growing in recent years.

This can only be accomplished through biologically-based benign synthesis processes using biotechnological techniques that are considered healthy and ecologically sound as an alternative to traditional physical and chemical methods for the development of nanomaterials. The notion of green technology or green nanobiotechnology has given rise to this.Figure 2 depicts the biological synthesis of nanoparticles using green technology[5].

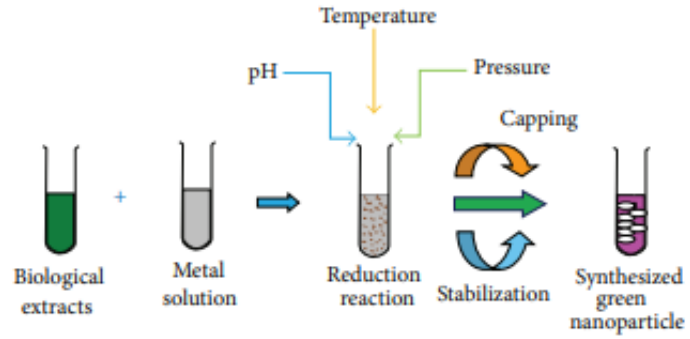

Figure 2: Depicts the biological synthesis of nanoparticles using green technology[6]

II. GREEN NANOBIOTECHOLOGY

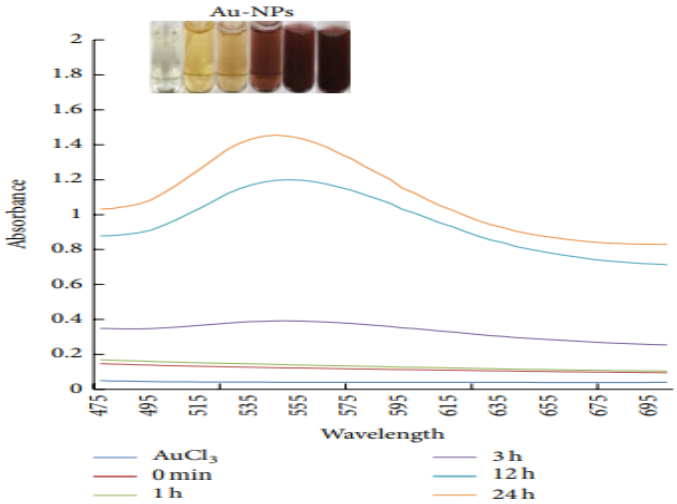

Figure 3: The UV-visible spectroscopy of gold nanoparticle[7]

In the case of magnetic nanoparticles, mono-dispersed particulate materials are difficult to synthesize. Magnetic field flow fractionation (MFFF) is also used to classify polydispersed magnetic nanoparticles, in which species are isolated based on magnetic susceptibility. This technique is ideal for materials in the range of nanometer to micrometre sizes[8]. Two major

techniques used for the preparatory size fractionation of nanoparticles are centrifugation and filtration procedures.Such approaches are cost-efficient and highly effective. In order to pellet fine particulate fractions and to isolate and harvest aquatic colloids or nanoparticles on TEM and AFM substrates, preparative ultracentrifugation is used[9].Figure 3 the UV-visible spectroscopy of gold nanoparticle.

III. CONCLUSION

There has been a lot of interest in the use of nanoparticles in the medical, food, pharmaceutical and agricultural industries, with an emphasis on developing more convenient methods for the development of eco-friendly, non-toxic and environmentally friendly nanoparticles using green biotechnology tools. In different applications, there are several factors that affect the quality and quantity of synthesized nanoparticles for their potential use. There is a need for suitable characterization techniques that can effectively classify synthesized nanoparticles and thus increase their use in environmental, electronic, and biomedical applications and applications for drug delivery. Different factors influencing the synthesis of nanoparticles and different techniques used to characterize them have been defined in detail in this study. Current and future green nanotechnology studies will provide a more comprehensive knowledge base of different factors influencing green nanoparticle synthesis and the most advanced technology that can be used to characterizesynthesized nanoparticles for their more effective future applications in the biomedical and pharmaceutical industries

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