



A Short Review on Recent Researches and Current Applications of Nanoparticles and their Future Opportunities

Rekha¹, Rahul Kataria², Triveni³*

¹⁻³ Smt. Indermani Mandelia Shiksha Niket, Pilani Rajasthan 333031

1. Abstract

Nanotechnology is an emerging technology. This review paper aims to find out the remaining fields where further research is required. We have find that nanoparticles can be used in Food packing, in medicinal field to increase bio availability of a drug, to affect the look and feel of cosmetics, medical devices, agriculture and Food, electronics, energy storage, environmental etc. This review article has summarized the applications of nanoparticles as well as provide the future aspects the applications of various nanoparticles.

2. Introduction

A nanoparticle is a small Particle whose size ranges between 1 to 100 nanometeres in size.[1] Nanoparticles exist in the natural world & are also created as a result of human activities.[2] Because of their submicroscopic size, they are unique material. Previously they were assigned to the field of colloids or 1 to 1,000 nm which is sometimes alternatively called the mesoscale.[3] Difference of nanoparticle & colloidal particles are essentially Semantic for particles below 100 nm in size. This technological branch is deeply concerned with the molecular structure of materials to change their intrinsic properties & obtain others with revolutionary applications.

3. Applications of nanoparticles

Nanotechnology is an emerging technology that can be used in various fields, some of which are unexpected. In this review article we have studied the several applications of nanoparticles as well as provide the Future aspects the applications of various nanoparticles.

3.1Medicine:-

3.1.1Diagnostics applications:- Nanoparticles have been used as imaging agents for diagnosis cancer and other infections diseases. These diagnosis are able to attack cancer cells selectively without harming other healthy cells.[4]

3.1.2In biological detection of pathogens:- Tissue & optical engineering has been additively used in nanodrugs and gene delivery.[5] Zinc oxide nanoparticles are one of the most important and Versatile materials, due to their diverse properties, Functionalities, various benefits and applications to human. In rats zinc nanoparticles added in Food to regulate in vitro synaptic transmission and to alter the spatial cognition ability by increasing long standing potentiation.[6] The Cu nanoparticles are effective in treating common microbial infections especially bacterial infections in respiratory, circulatory and digestive system. Also Cu nanoparticles have been used in medicine (anti cancer agents) and (dentistry), biological and bio sensing antimicrobial textiles, environmental remediation.[7]

3.1.3Applications in cancer treatment:- A lot of the cancer treatment options facilitated by nanoparticles are an extension of the capabilities mentioned-targeted drug delivery, early diagnosis, mapping and labeling tumors and so on.[8]

3.2Textiles:-

Nano technology makes it possible to develop smart fabrics that neither stain nor wrinkle as well as stronger, lighter and more durable materials to make motorcycle, helmets or sports equipment. However more research is required in this field.[9]

3.3 Additive:- Due to the unusual properties nano powder of nickel is one of the most common and popular additives in the manufacturing of several different materials. Which includes different varieties of ceramics and lubricants. Moreover it provides sintering of another materials aid as an additive.[10]

3.4 Defense & Security:- Nano-materials have also been development for use in the military. They have used in developing sensor system. Also using nanomaterials such as titanium dioxide, that can detect biological agents, use to produce a better of camouflage, through injection of the particles into the material of soldiers uniforms.[11]

3.5 Application in Electronics:- Due to small size and allowing more transistors to be packed into a single chip, the uniform and symmetrical structure of nanotube allows a higher electron inability, higher dielectric constant and a symmetrical electron. Carbon nanotubes are close to replacing silicon as a material for making smaller, faster and more efficient microchips and devices as well as lighter, more conductive and stronger quantum nanowires.[12]

3.6 Food:- In food processing, nanocapsules are new instruments design for food preservatives. Nanocapsules techniques have been used to broadly improve the Flavour release and retention. SiO_2 are used as colour or flow agents in food items and flavour in food product. Nanotechnology can be applied in the production, processing, safety and packaging of food. It is possible that nanotechnology will have allow the manipulation of the molecular forms of food to provide more capability, lower costs and greater sustainability that at present.[13]

3.7 Agriculture:- Sp nanoparticles can be utilized as pesticides, delivery agent for herbicides and fertilizers, target specific delivery of proteins, nucleotide. Chemicals in plant as a component of nanozelollite for increasing water holding capacity. Nano particles are those that stem from manipulating or arranging matter at the nanoscale to provide better countings. Composites or additives and those that exploit the particles. Treatment technologies, atmospheric water harvesters and desalination plants to produce safe water.[14]

3.8 Application in chemical & cosmetics:- In the cosmetics industry, nanoparticle such as titanium oxide are used in sunscreen, due to the poor stability that conventional chemical UV protection offers in the long terms. . Nanoparticles are able to provide improved UV protection while also having the added advantage of removing the cosmetically unappealing whitening associated with Sunscreen in their nano-form. ZnO nanoparticles are specially used in sunscreens as they have inherent capacity to permeate UV-A and UV-B radiation. Because of the exceptional trait ZnO nanoparticles based sunscreens provide extensive protection compared to other sunscreen agents.[15]

4. Future opportunities:-

Nanoparticles have been already applied as drug delivery system with great success. Nanoparticles provide massive advantages regarding drug targeting, delivery and with their potential for combine diagnosis and therapy and one of the major tools in nanomedicine. Nano-enabled drug delivery also makes it possible for drugs to permeate through cell walls, which is of critical importance to the expected growth of genetic medicine over the next few years . Future developments are to use nano-technology to create smart and interactive textiles that can sense electrical, thermal, chemical, magnetic or other stimuli. The method of synthesis of nanoparticles are out of scope of this paper but improvement in their methodologies too needs improvement with special emphasis on green chemistry synthesis.

5. Conclusions

We can here conclude that nanoparticles has been succesfully imparted its application in most of the fields, while some of the fields are yet to explore. So nanoparticles seems a promising field of research providing value and reason to explore this field more.

6. References

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