



Short Review Paper

Applications of nanomaterial in daily life

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Available online at: www.isca.in, www.isca.me

Received 6th June 2020, revised 22nd September 2020, accepted 1st October 2020

Abstract

Nano Synthetic materials possibly demonstrate with exclusive characteristics that be different from bulk materials. The outstanding characteristic properties of nanomaterial not only significant advantages as well as confers toxicity, because of their unnecessary connections with similar compartments with cellular process. In report review, we talk about the variety of way in route of nanomaterials in the human being with their applications in on a every day basis.

Keywords: Nanomaterials, nanocomposite, nanotubes and quantum dots.

Introduction

The word of nanotechnology is combination of two words first one is technology and second one is the Greek numerical “nano” that means dwarf. Thus, the nanotechnology is the branch of science and study of object around 100 nm in size. While nanoparticles have existed in our atmosphere whole time and exist in form of clays, minerals and products of bacteria and have been used before long times and the scientifically designed nanomaterials also called nanoparticles and they appeared from the last few years and used by our society in daily life.

Nanotechnology has become growing significant in current years a large field of applications in different branches of Science & Technology like as a Chemistry, Physics, Materials Science, Biology, Medicine, Management and Environmental etc. and thus provided a intense contact with our everyday lives. Nanoscience is a move ahead technique which has more and more entered in the on a daily basis, and conquering an improved significance in many fields. Continue increasing the number of commercial nanoparticles products is offered; however, simply a few nanomaterials are presently used in bulk number of amounts but they trip into our daily lives without our awareness. As a capable policy for growth of nano-based ingredients consumer stuff in the marketplace such as cosmetics, building resources materials, paints as well as in medicinal action. In this review paper, we consider a variety of nanomaterials and effect in our body with their applications in everyday life.

Nanomaterials

Presently nanomaterials are man-made and used at extremely large scale. Nanomaterials are developed to demonstrate novel

quality compared to the similar material without nanoscale quality, such as bigger strength and chemical reactivity as well as conductivity. Commonly such type of materials contains nanotubes, dendrimers, fullerenes and quantum dots. Nano size materials are used in very large amount in the field of nano and such type of properties like as physical and chemical are different from common type of materials as silver nanoparticles, fullerene, carbon nanotubes, silica and photocatalyst etc.

Nanocomposites

Nanocomposites are resources that include nanosized particles into a matrix of criterion material. The outcome of the addition of nanoparticles is a extreme enhancement of features to can consist of electrical, mechanical strength and thermal conductivity. These factors cooperate a key function of reducing operating costs of transportation in form of ground, underground aircraft and space industry. At the present time, it is unfeasible to imagine the existence of any vehicle without the presence of a polymer composite³.

Nanotubes

Generally nanotubes are synthesized by sheets of organic and inorganic self-assembling and in this nanomaterial the atoms are orderly arranged in form of tubes with single or multi walled nanostructures as well as large internal volume. The surface of nanotubes without trouble functionalized and one of the mainly admired nanotubes is carbon nanotubes. CNTs are used in biomedical applications is presently in progress, it has great potential. While an enormous part of the human body is prepared of carbon, it is regularly and carefully a very biocompatible material. The enlargement of cells on CNTs has been verified; so it seems that have no toxic outcome.

Physically modified as well as functionalize chemically synthesized CNTs sidewalls are also gives rise to biomedical applications in field of neuron growth and vascular stents as well as regeneration as well as established that a single strand of DNA can be bonded to a nanotube.

Quantum dots

Quantum dots (QDs) are artificial nanoscale materials, so it can use for electrons transport. UV- Visible light strike on semiconducting nanomaterials, then release a variety of light colours. These synthetic nanomaterials that have originate different mode of applications in field of composite, as well as solar cells and fluorescent biological labels. Quantum dots are also significant application for medical field of applications such as possible cancer therapy. It capable to easily planned so they assemble in exacting parts of the human body and then transport anti-cancer drugs bound to them and it's a big benefit for own organs, such as liver and more specifically than predictable drugs. At present time different type of metal nanomaterials are useful for organic dyes in biological research field such as nanoscopic, light bulbs as well as colour specific cells they are require to be considered under microscope and are also being used as chemical sensors for chemical and biological warfare agents like as anthrax. Mainly dyes, are operate in excess amount in comparison from colours and these colours are degrade comparatively quickly. Quantum dyes are very bright it can be used for fabrication of any colour of visible light.

Nanocrystal

Nanocrystal are arranged at least one dimension manner with lesser than 100 nm and during this calm of atoms in either a single or poly crystalline arrangement. The size of nanocrystals distinguishes them as from larger size crystals. The nanocrystalline outside layer of AgNPs rapidly kills a broad range of bacteria and microbes around 30 minutes as well as astromedica created a nanoparticulate based on artificial human bone. Manufactured human bones are prepared by phosphate and calcium composite is known as Hydroxyapatite. By synthesized metal nanoparticle of phosphates and Ca have molecular altitudes that are formed just like original material so that is equal in structure with work of art to normal bone. These synthetic bone are can be useful for areas where natural bone is injured and isolated, like as conditions of the elastic tissue injuries and bone fractures.

Application of Nanotechnology

Different types of synthetic nanomaterials in various applications in our daily life from user supplies to drug and tablets with recovering the atmosphere. Nanotechnology is also being useful too or developed for array of industrial and water and air purification processes. Currently synthesized nanomaterials are gradually incoming in our daily life and existence, which are successful and improve in many different type of fields; like as nanomaterial based ingredients used in

daily many stuff on the market like as paints medicines, building materials, cosmetics with also food these some are follows:

Electronics area

Nanomaterial is holds on increasing the common characteristic capabilities of electronic strategy can be enlarged with reducing their mass and power utilization. They consist of display screens improving of electronics substance as well as raising and increasing the solidity of memory chips. Through the nanotechnology can also be used for shrink the shape of smallest transistors used for integrated circuits.

Environment field

Nanomaterials is used by human in large amount for different approach to develop the ecofriendly. Such as purifying environmental pollution and renovate industrialized mode to decrease the descent of recent pollution and manufactured ecofriendly energy resources as well as cost effective etc.

Medicine field

One of the nanotechnology applications in field of medicine, at present time developed involves make use of nanoparticles to drugs deliver or other specific activities like as cancer cell tissues. Metal nanoparticles are design so that are tempt to contaminated cells which are allow apparent action of individual's cells. These techniques are useful for decrease damage to safe cells in the body and permit for former recognition of ailment. For example, different type of metal NPs that are used in technic of chemotherapy drugs frankly to cancer cells are under improvement.

For potential application

Utilization of Ag nanoparticles as a catalysts extensively decrease the polluting agent like as propylene oxide its produce during the process used to fabrication of general materials such as paint, plastics, detergents etc. As well as diesel fuel Inclusive cerium oxide nanomaterials reduce and control the pollution.

Manufacturing

Nanomaterial solar cells are generally generate electricity power at a competitive less amount. Researchers manufactured of silicon metal nanowire that is implanted in a polymer results in comparative cheap but high excellent efficiency solar cells. Produce the power by solar cells results are cost effective comparative to other fuels like coal or oil. Epoxy carbon containing nanomaterials is being used for windmill blades and the resultant carbon containing blades are massy as well as lower weight comparative to other matter so the quantity of electricity power produce by windmill are much bigger.

Consumer Products

Nanotechnology set up its different type of consumer products each and every one use every day in life, from clothing to skin treatment. In field of science the nanotechnology is the most enlarge technology of revolution mand in the 21st century and is designed as a major advantage in field of cosmetic business. At current time cosmetics products are preserving as which are increase the appearance of the skin as well as intensify the purify with encourage the fineness⁴. Many metal nanoparticles are used for skin care and which are used for deliver such as sunscreens, those metal nanoparticles to resistance for UV rays without separation white residue on the skin. Silica metal nanoparticles that are used for fill the spaces between carbon fibers which are increase the strengthening the rod without rising the weight of fibers. Those are allowing clothing manufacture the electricity power through ordinary motions.

Lithium ion based batteries that are used electrodes powering plug-in electric cars. These batteries are generally formed by lithium ion and metal nanoparticles. A nonporous insulator that are used in insulating for the walls of house, then only need for one third the thicknesses of wall if we are used this material in that location of conventional insulation. Commonly increasing the existing power strength from the battery and diminishing the required time for recharge a battery. All these type of advantage are achieved by nanoparticle outside layer the surface on electrode. Which are responsible for increase the surface area of the metal electrode and allowing more current to flow in between electrode and the electrolytic chemical within the battery, present system could be increase the capacity of hybrid vehicles by significantly reducing the mass of the batteries. Another thing, if elongate the shelf life of electric power battery by using metal nanomaterials, this deviation prevents the low level discharge that be happen in a conventional battery, which are responsible for increases the life time of the battery.

Available Products in the Market

Nanoparticles are including here these types of properties like physical and chemical reactivity as well as transparency, solubility strength and colour of metal. Which are responsible for build up interesting in field of cosmetics and personal care⁵ and they may skin absorption properly by promoting diffusion by the cosmetic into the surface of skin. However static, as well as insoluble metal nanoparticles, like as Zinc oxide, titanium dioxide, gold and silver nanoparticles are may direct enter the human body and they help us of protection from bacteria and microbes^{6,7}.

Personal care products like Revital Lift nanosomes and capsule, needle shaped tablets-like nano structures which are responsible for to move of active ingredients into the skin's external layer and then release them, those who are useful for our body. Another one Chemical Free Sunscreen like as SPF 15 contains

nano-sized particles of titanium dioxide as the active ingredient for body skin, as well as in the food nutritional nanomaterials containing supplements such as Zn, Cu, Ag, Au, P and K are present those are antibacterial and antimicrobial agent which are care of our body from disease. Another one chemical free sunscreen like as SPF 15 contains nano-sized particles of titanium dioxide as the active ingredient for body skin, as well as in the food nutritional nanomaterials containing supplements such as Zn, Cu, Ag, Au, P and K are present those are antibacterial and antimicrobial agent which are care of our body from disease.

Conclusion

Nanotechnology field is recognizing as extremely liberal and revolutionizing field of science. In this review paper we have discuss some efforts have done to compile of nanotechnology. This work associated with field of physics and chemistry for nanoparticle and utilization tailored properties via various field. Nanomaterials are the building blocks of nanoscience and in which can be physically and chemically manipulated for specific purposes of utilization. Nanotechnology shows the significant role in field of science such as cosmetic, nanobiotechnology dermatology as well as drug delivery application. Nanotechnology of science has been focused on new concepts and applications with fundamental research. Thus the nanotechnologies are the current and future of the science technology.

References

1. Logothetidis S. (2012). Nanostructured materials and their applications. *Nano Science and Technology*, 12, p. 220.
2. Maynard A. D. (2006). Nanotechnology: A Research Strategy for Addressing Risk. Woodrow Wilson International Center for scholars, Project on Emerging Nanotechnologies. PEN, 03, Washington, DC.
3. Lyu M. and Choi T.G. (2015). Research trends in polymer materials for use in lightweight vehicles. *Int. J. Precis. Eng. Manuf.*, 16, 213.
4. Gautam A. and Vijayaraghavan R. Singh (2011). Dermal exposure of nanoparticles: an understanding. *Journal of Cell and Tissue Research*, 11(1), 2703-2708.
5. Raj S., Jose S., Sumod U.S. and Sabitha M. (2012). Nanotechnology in cosmetics: opportunities and challenges. *J Pharm Bioallied Sci.*, 4(3), 186-93.
6. Schäfer-Korting M., Mehnert W. and Korting H.C. (2007). Lipid nanoparticles for improved topical application of drugs for skin diseases. *Adv Drug Deliv Rev.*, 59(6), 427-43.
7. Katz L.M., Dewan K. and Bronaugh R.L. (2015). Nanotechnology in cosmetics. *Food Chem Toxicol.* 85, 127-37.

