

Nanotechnology and Nanomaterials in Everyday Life

Dr. Niranjani Chaurasia

Assistant Professor, Department of Chemistry, Sri J.N.P.G. College, Lucknow, U.P. (India)

Abstract: *Technology is one of the key words in people's lives. In the near future, a subdivision of technology which is nanotechnology will have an important role. Bio-products, tools, devices, materials are influenced from consequences of research and developments on nanotechnology. Nanotechnology is the science and technology of very small things in particular, things that are less than 100 nanometers in size. Nanotechnology is an advance technique which has progressively entered in the everyday life, conquering an increased importance in many fields. As an emerging strategy for development, nano-based ingredients have found a place as consumer products in the market such as paints, building materials, cosmetics and in medical treatment, the food industry and so much more. In fact, it's becoming increasingly harder to keep track of where nanotech isn't. We are using it in our daily lives and not even realizing it. With nanotechnology; more useful devices, better drugs for diseases, more appropriate materials for construction will be developed.*

Keywords: nanotechnology, nanomaterials, applications in field of medicine, electronics, consumer products

1. Introduction

Nanotechnology is the science and technology of very small things in particular, things that are less than 100 nanometers in size. The area of nanoscience and nanotechnology has become increasingly important in recent years a wide variety of applications of these materials are expected in various branches of Science & Technology comprising Physics, Chemistry, Biology, Materials Science, Medicine, Computational Science, Environmental Science, Management Science etc. and thus providing a profound impact in our daily lives.

As we wake up in the morning, nanotechnology is probably the furthest thing from our mind. Yet throughout the day at every step we have unknowingly encountered it. From the wrinkle-free shirt and sunglasses we wear to computer hard drives and even cosmetic products, to the way to office nanotechnology is there. The nanoparticle in the bumper of a car reduces weight. Other side nanoparticles boosted our sunscreen's ability to reflect harmful ultraviolet radiation, rendered shirt with that just-ironed look and armoured our designer shades.

Nanotechnology is an advance technique which has progressively entered in the everyday life, conquering an increased importance in many fields. As an emerging strategy for development, nano-based ingredients have found a place as consumer products in the market such as paints, building materials, cosmetics and in medical treatment, the food industry and so much more. In fact, it's becoming increasingly harder to keep track of where nanotech isn't. We are using it in our daily lives and not even realizing it.

With nanotechnology; more useful devices, better drugs for diseases, more appropriate materials for construction will be developed.

2. Applications of Nanotechnology in Various Fields

Though nanotechnology is a relatively new science, it already has numerous applications in everyday life, ranging from consumer goods to medicine to improving the environment. Nowadays nanomaterials are progressively entering in the everyday life, conquering an increased importance in many fields of technology; nano-based ingredients can be found in many products on the market such as paints, building materials, cosmetics and also food. Some are follows:

Medicine: One application of nanotechnology in medicine currently being developed involves employing nanoparticles to deliver drugs, heat, light or other substances to specific types of cells, such as cancer cells. Particles are engineered so that they are attracted to diseased cells, which allow direct treatment of those cells. This technique reduces damage to healthy cells in the body and allows for earlier detection of disease. For example, nanoparticles that deliver chemotherapy drugs directly to cancer cells are under development. Drugs containing dendrimers for targeted delivery.

Electronics: Nanoelectronics holds some answers on expanding the capabilities of electronics devices can be expanded while reducing their weight and power consumption. These include improving display screens on electronics devices and increasing the density of memory chips. Nanotechnology can also reduce the size of transistors used in integrated circuits.

Environment: Nanotechnology is being used in several applications to improve the environment. This includes cleaning up existing pollution, improving manufacturing methods to reduce the generation of new pollution, and making alternative energy sources more cost effective. Potential applications include:

- The use of silver nanoclusters as catalysts can significantly reduce the polluting byproducts generated in the process used to manufacture propylene oxide.

Volume 6 Issue 4, April 2017

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Propylene oxide is used to produce common materials such as plastics, paint, detergents and brake fluid.

- Diesel fuel containing cerium oxide to reduce emissions.
- Increasing the electricity generated by windmills. Epoxy containing carbon nanotubes is being used to make windmill blades. The resulting blades are stronger and lower weight and therefore the amount of electricity generated by each windmill is greater.
- Producing solar cells that generate electricity at a competitive cost. Researchers have demonstrated that an array silicon nanowire embedded in a polymer results in low-cost but high-efficiency solar cells. This may result in solar cells that generate electricity as cost effectively as coal or oil.

Consumer Products: Nanotechnology has already found its way into numerous consumer products we use every day, from clothing to skin lotion. They include:

- Silver nanoparticles in fabric that kill bacteria making clothing odor-resistant.
- Skin care products that use nanoparticles to deliver vitamins deeper into the skin.
- Lithium ion batteries that use nanoparticle-based electrodes powering plug-in electric cars.
- Flame retardant formed by coating the foam used in furniture with carbon nanofibers.
- Certain sunscreens containing titanium dioxide and a face cream containing fullerenes.
- Certain food products, for example vegetable oils, containing nanodrops of components such as vitamins, minerals, and phytochemicals.

3. Some Examples of Nano Materials

Nanocomposites: A Plastic nanocomposite is being used for "step assists" in the GM Safari and Astro Vans. It is scratch-resistant, light-weight, and rust-proof, and generates improvements in strength and reductions in weight, which lead to fuel savings and increased longevity.

Nanocrystals: Smith & Nephew markets an antimicrobial dressing covered with nanocrystalline silver. The nanocrystalline coating of silver rapidly kills a broad spectrum of bacteria in as little as 30 minutes.

Astromedica has produced a nanoparticulate based synthetic bone. "Human bone is made of a calcium and phosphate composite called Hydroxyapatite. By manipulation calcium and phosphate at the molecular level, they have created a patented material that is identical in structure and composition to natural bone. This novel synthetic bone can be used in areas where natural bone is damaged or removed, such as in the treatment of fractures and soft tissue injuries.

4. Various Products in the Market

- Cosmetics and personal care products: RevitaLiftR intense Lift Treatment Mask (L'OrealR)-uses nanosomes, tiny capsule-like structures, to transport active ingredients into the skin's outer layer and then release them.

- Chemical-Free [sic] Sunscreen SPF 15 (Burts BeesR, Inc.)-contains nano-sized particles of titanium dioxide as the active ingredient.
- Food Supplements and food storage: Mesozinc nutritional supplement containing 30 parts per million (ppm) zinc nanoparticles.
- FresherLonger Miracle Food Storage (Sharper ImageR)- food storage containers are infused with silver nanoparticles as an antibacterial agent.
- Silver Nano Baby (Baby DreamR Co., Ltd.)-"silver nano poly system" acts as an antibacterial and deodorizer.
- Appliances: SamsungR Washing Machine (SamsungR)- Silver nano technology "sterilizes your clothes. DaewooR Vacuum Cleaner (DaewooR) nano-silver coated cyclone canister removes bacteria. Samsung R Air Conditioner contain silver nano filter and silver nano evaporator.
- Clothing: Sport Anklet Sock (AgActive)- treated with nanoparticles of silver (typically 25 nm) as bactericide and fungicide.
- Coatings: Pilkington Activ Self Cleaning Glass-glass coating that works with ultraviolet (UV) light and rain to keep glass free from organic dirt. UltimaR Photo Paper (Eastman KodakR Company)- nine-layer composition incorporates ceramic nanoparticles to resist the effects of heat, humidity, light and ozone.
- Electronics and computers: Invisicon (EikosR)- Invisicon ink used to create transparent conductive coatings and manufacture printed circuits on transparent plastic films; Microprocessor chip manufactured by IBM using IBM's 90 nanometer Silicon on Insulator (SOI) technology to reduce heat and improve performance.

5. Conclusion

In this paper, the efforts have done to compile the small wonders of nanotechnology and that may be already be in our world and some that may be on the horizon. Nanomaterials are the building blocks of practical nanotechnology and can be physically and chemically manipulated for specific purposes. Nanomaterials play an important role in development of science and technology in various fields such as nanomedicine, nanobiotechnology, green nanotechnology, industrial sectors and in reduction of energy consumption. Thus nanomaterials and nanotechnology are the current and future of the technology.

References

- [1] C. Stuart, 2011, Nanotechnology in everyday life. Nanotechnology World. Available at: <http://www.theguardian.com/nanotechnology-world/nanotechnology-in-everyday-life>, Retrieved march 2014.
- [2] P Bradley, 2011, Everyday Applications of nanotechnology. Available at: <http://ccweek.com/article-2630-every-day-applications-of-nanotechnology.html>, Retrieved march 2014.
- [3] Current Nanotechnology Applications. Nanotechnology Now. Available at: <http://www.nanotechnology-now.com/current-uses.htm>, Retrieved march 2014.

[4] Benefits and Applications. Available at:
<http://www.nano.gov/you/nanotechnology-benefits>,
Retrieved march 2014.

