AN OVERVIEW OF NANOTECHNOLOGY'S EFFECTS ON HUMAN LIFE

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Abstract: Life would not be the same without technology. Because of its many practical uses, nanotechnology has recently emerged as the most widely used sector of technology. Nanostructured materials, such as nanoparticles, nanopowders, nanowires, nanotubes, nanorods, nanofibers, dendrimers, nanoclusters, and nanocrystals, are produced in large quantities worldwide because of their potential applications in a variety of fields, including biotechnology, electronics, photonics, medicine delivery, and agriculture. This technique seems to be the solution to the global issues of water and environmental pollution. In addition to the immense benefits of nanotechnology, nanomaterials have negative consequences on human health that must be taken seriously. While some nanoparticles enter the body through the lungs or other organs through food, drink, or medication, they can also affect various organs and tissues such as the kidney, liver, brain, etc. and have cytotoxic effects. Certain nanoparticles can enter the body through breathing and cause damage to lung tissue and chronic breathing problems. The form, size, concentration, solubility, and stability of a nanoparticle all have a significant impact on its hazardous effect and interactions with biological systems. Therefore, it becomes essential to comprehend the risk and expense of any consequent harm while using new technologies. For the sake of society's safety, it is thus essential to research the different nanostructure materials and their human exposure. With an emphasis on their usefulness and toxicity, this paper provides a concise overview of the applications and potential effects of Ag and TiO2 nanoparticles on human health and the environment.

Keywords: Nanotechnology, Nanoparticles, Human life

INTRODUCTION

Nanomaterials are not brand-new. Humans accidently made and exploited this

substance ages ago. Artists colored the stained glass windows of medieval churches with nanoparticles of gold and silver. The gold particles are ground into ever-tinier fragments by artists, which causes the color to shift from yellow to blue, then green, and eventually red. Colloidal metals were employed as both a fabric dye and an arthritic remedy.

But in the past several decades, the capacity to "see" and deliberately alter matter has emerged. The first person to imagine man-made molecular machines constructed with atomic accuracy was the famous physicist Richard Feynman, but it took more than 20 years for his vision to become a reality due to advancements in technology and microscopy. Over the last 20 years, there has been significant advancements in nanoscience and technology, with many of its applications becoming practical.

However, there are still a lot of unanswered questions about nanoscience and technology, as well as a lot of difficult areas that need further study and development in the future. The purpose of this review article on nanomaterials, such as titanium dioxide and silver nanoparticles, is to highlight how important it is to look at the toxicological consequences of nanomaterials in addition to the wide range of applications that they may be used in.

Titanium Dioxide (TiO_2)

TiO_2, or titanium dioxide, is a complex substance. This is the stuff that makes paint opaque and toothpaste white.In addition, TiO_2 is a potent photocatalyst that, when exposed to sunlight, can decompose practically any organic compound. As a result, several businesses are attempting to take advantage of titanium dioxide's reactivity by creating a broad range of environmentally friendly goods, such as ceramic tiles, self-cleaning textiles, and auto body finishes. These days, the major places to find them are in wood preservatives, textile fibers, and sun protection lotions with a high factor. Sun creams have been made with titanium oxide microparticles added for a long period, giving the goods a pasty, sticky quality. It was difficult to apply these sunscreens without leaving a noticeable film, and it was bad for the skin. It is significantly easier to apply sun creams that include the transparent nanoscale titanium dioxides. Furthermore, they have much higher protection against damaging UV light. Currently, titanium dioxide that has been nanosized is the only way to get strong UV protection.

Applications of titanium dioxide

A photocatalyst is a substance that reacts chemically when light hits a substance that is photosensitive, like titanium dioxide. Organic toxic odors break down when light

reaches titanium dioxide because the material undergoes recurrent chemical reactions in the area [1].

Applications for Environmental Improvement: TiO_2 eliminates hazardous inorganic substances called SOx from the atmosphere as well as pollutants like NOx and exhaust gas.

Applications for Purifying Water: TiO_2 also promotes the breakdown of hazardous organic materials, including trihalomethane, tetrachlorethylene, and organic chlorine compounds. For instance, the following procedure explains how chloroform decomposes:

$H_2O + CHCl_3 + (1/2)\ O_2 \rightarrow CO_2 + 3HCl$

Are Titanium Nano Particles Safe?

It is uncertain what the safety profile of nanoparticles is for young children and babies. According to several research, the safety issue over titanium nanoparticles may be "overblown." It has been shown that adult mice exposed to titanium dioxide nanoparticles develop emphysema and lung flares. Furthermore, prolonged irritation and detrimental effects on lung development might result from exposure of developing lungs to nanoparticles, raising the risk of respiratory disorders. [/2]

Inhaled titanium nanoparticles may cause lung damage. When rats were exposed to titanium compounds in their air, researchers at the National Institute of Occupational Safety and Health in Morgantown, West Virginia, found that the amount of lung damage increased significantly. [/3]

Titanium's Effect on Your Brain

Your brain may be harmed by titanium exposure. Via the nose and olfactory bulb, titanium nanoparticles may enter the brain's hippocampus region directly. According to a research by the National Politécnico Institute's Escuela Superior de Medicina, titanium dioxide is harmful to the brain's glial cells.[4]

Environmental pollution and long-term chronic exposure are little studied, and there may be a link between nanoparticle exposure and the onset of degenerative brain illnesses. (5)

SILVER NANO PARTICLE (AG)

Although nanotechnologists are not new to the field, recent studies indicate that nanosilver has been used for more than a century in a wide range of goods. Since the beginning of its usage, tiny silver particles known as "colloidal silver" have been recognized to have antibacterial properties.

Nanoparticles are used in many different goods and have special optical, electrical, and thermal capabilities. They are also used in biological and chemical sensors in optoelectronics. For instance, silver nanoparticles are used in wired ink, paste, and filler to provide low sintering temperatures, strong electrical conductivity, and stability. Molecular diagnostics and photonic devices that make advantage of these nanoparticles' novel optical characteristics are other uses. To offer protection against germs, antimicrobial coating includes numerous fibers, nanoparticles, wound dressing, and biomedical components.

Application of Silver Nanoparticle

Because of their desirable optical, conductive, and antibacterial qualities, silver nanoparticles are employed in a broad variety of consumer items and technology.(6)

Application to Diagnosis: Materials containing silver nanoparticles may be used as biological markers for quantitative detection in a variety of assays and biosensors.

Antibacterial Uses: Paints, dressings, household appliances, clothes, footwear, cosmetics, and plastics all employ silver nanoparticles due to their antibacterial qualities.

Conductive Applications: To increase thermal and electrical conductivity, silver nanoparticles are added to composite materials and used in conductive inks.

Optical Applications: Metal-enhanced fluorescence (MEF) and surface-enhanced Raman scattering (SERS) are two examples of modern optical spectroscopy techniques that use silver nanoparticles for effective light gathering.

Nano Silver Health Risk

Small particles may infiltrate cells and cause damage, as shown by Danish researchers, suggesting that food supplements containing nanosilver may be hazardous to health. The food and cosmetics sectors employ silver because of its antimicrobial qualities. Food packaging, toothbrushes, band-aids, sports socks, and beverage bottles all contain nanosilver. Along with its advertised antibacterial, anti-influenza, and anti-cancer properties, it is also sold as a nutritional supplement. In the UK, nanosilver is regulated and readily available online. Based on study from Southern Denmark University suggesting that nano silver might alter cells, Danish Veterinary and Food Governance will take dietary supplements. Professor Thiago Verano-Braga said, "Silver does not exhibit risk as a metal; rather, risk arises when the particles become small enough to penetrate the cell walls." A human cell that has nanosilver inside of it has the ability to alter. It is evident to them that "Nano silver creates hazardous

interferences in cells caused by free radicals." We are also evident in the quantity of proteins and shapes. It mocks us. Excessive generation of free radicals in cells is a hallmark of many disorders, such as Parkinson's, Alzheimer's, and cancer.Kjelsen and Verano-Braga are unaware of the dosage of nano silver to which he should be exposed prior to this transformation taking place, given ACS Nano's study was carried out in lab settings using human cells. "We're not sure how much you really need. Therefore, although we cannot infer that Nano Silver may harm you, we can state that the excessive creation of free radicals in human cells is cause for concern." The 15th of May, 2014 This news is reported by Cell Biology, Food Beverage & Beverage.

CONCLUSION

The impacts of manufactured nanoparticles on the environment's flora and fauna are seldom documented in literature. To assess the impact of nanoparticles on people, several studies have examined the absorption and activity of the particles at the cellular level. The findings of this study may plausibly be applied to other species, although more investigation is required to validate this conjecture. Additionally, to determine the real influence of nanoparticles on the environment and how they vary from bigger and more prevalent forms of matter, careful planning for future research as well as rigorous analysis and interpretation of the data already available are necessary. The environmental issues caused by persistent insoluble nanoparticles may be even more dangerous than those found in evaluations of human health.

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