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Uses of Nano-Materials in Different Fields

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ABSTRACT In this paper, we have discussed various types' use of nano materials in different fields like medicine, chemistry & environment, energy, computers & communications and others which make easy the style of modern human life.

KEYWORDS Nanomaterials, Nanotube, Optical properties

INTRODUCTION

Nanotechnology is an emerging interdisciplinary technology that has been booming in many areas during the recent decade, including materials science, mechanics, electronics, and aerospace. Its profound societal impact has been considered as the huge momentum to usher in a second industrial revolution [12]. When a material is reduced down 10^{-9} m, its chemicals, thermal, optical, mechanical, electrical etc. properties get changed. Nano materials are many thousand times smaller than the diameter of human hair. Uses of nanomaterials in different field are enormous and limitless, e.g by nano-particals can be used to destroy cancerous cells, pacemaker built of nano tubes can be used to correct heart dysfunctions, nano-particals can be used to purify the water that contains Arsenic etc, by using nanotechnology, we can increase the memory and speed of computer, thus, the future of Nanotechnology is bright. This technology is supposed to be helpful to improve the quality, health and comforts of the mankind.

The potential of Nanotechnology to revolutionise the Healthcare, textile materials, Information and Communication technology, and energy sectors has been well-publicised. In fact several products enabled by nanotechnology are already in the market, such as anti-bacterial dressings, transparent sunscreen lotions, stain-resistant fabrics, scratch free Paints for cars, and self cleaning windows. Uses of nano materials in different fields of Nanotechnology to the agricultural and food Industries was first addressed by a United States department of agriculture road map published in Sept. 2003. The prediction is that nanotechnology will transform the entire Food Industry, changing the way food is produced, processed, transported and consumed [13].

USES OF NANO-MATERIALS IN DIFFERENT FIELDS

1. Chemistry and Environment

The nanotechnology also includes chemical catalysts and filtration techniques. The synthesis provides novel materials with tailored features and properties in the case of nanoparticles with distinct chemical ligands or specific optical properties. All chemical synthesis can be understand in terms of

Nano-technology because it has abilities to manufacture certain molecules which have size in order of nanometer, thus chemistry form a case for the existence of Nanotechnology giving tailor made molecules, Polymers as well as clusters and nanoparticles.

Catalysis

Catalysis has vital role for the production of different type of chemicals which also belongs the information of Nanomaterials. Platinum Nano material now being considered in the next generation of automotive catalytic converters because very high surface area of nanoparticles could reduce the amount of platinum required [7]. However, some concerns have been raised due to experiments demonstrating that they will spontaneously combust if methane is mixed with ambient air [2]. The research institute (Centre National Dela Research Scientific) in France may resolve their true usefulness for catalytic uses of nano materials [3].

Filtration

The waste-water treatment, air purification and energy storage devices may be also expected in a strong influence of nanochemistry. Mechanical or Chemical methods can be used for effective filtration techniques. One class of filtration techniques is based on the use of membrane with suitable whole sizes whereby the liquid is pressed through the membrane. Nonporous membranes are suitable for a mechanical filtration with extremely small pores smaller than 10nm and may be composed of nanotubes. Nanofiltration is mainly used for the removal of ions or separation of different fluids. Nanofiltration may come to be on important application although future research must be careful to investigate possible toxicity [5]. Magnetic nanoparticles offer an effective and reliable method to remove heavy metal contaminants from waste water by making use of magnetic separation techniques. Some water-treatments devices made by nano-technology are available on the market. Low cost nano-structural separation membranes methods have been shown to be effective in producing water portable water in a recent study [5].

2. Medicine

The biological and medical research communities have exploited the unique properties of nano-materials for various applications. The biomedical nano technology, bio nanotechnology and nanomedicine are used to describe this hybrid field. The size of nanomaterials is similar to that of the most biological molecules and structure and hence nanomaterials can be used for both in vivo and In vitro vessels would generate elementary for heart function. Thus the integration of nanomaterials with biology leads the development of following aspects.

Diagnostics

Nanotechnology-on-a-chip is one more dimension of lab-on-a-chip technology. Biological tests measuring the activity of selected substance become quicker, very sensitive and more flexible. Magnetic nano-particles are used to label specific molecules, structure or micro-organism. Gold nanparticles tagged with short segments of DNA can be used for detection of genetic sequence in a sample. Nanopore technology for analysis of nucleic acids converts nucleotides into electronic signatures.

Drug delivery

Nano technology is also opening up new opportunities in implantable delivery Systems, which are often perfectible to use of injectable drugs. This rapid rise may cause difficulties with toxicity and drug efficiency can diminish as the drug concentration falls below the targeted range. The overall drug consumption and side-effects can be lowered significantly by depositing the active agent in the morbid region only and no higher dose than needed. This highly selective approach reduces costs and human suffering.

Tissue engineering

Nano medicine is used to reproduce or to repair damaged tissue of living beings. This is called "Tissue Engineering". This makes use of artificially stimulated cell proliferation by using suitable

nanomaterials. Today the tissue engineering might replace conventional treatments like organ transplants or artificial implants. The tissue engineering is also closely related to the ethical debate .on human stem cells and its ethical implications.

3. Energy

Now a day some methods are discovered with the help of nano-technology like nanocatalyst enhanced fuels for better efficiency. The most advanced nanotechnology projects related to energy are storage, conversion, manufacturing improvements by reducing materials and process rates, energy saving and enhanced renewable energy sources. There are some proposed projects relating the nanomaterials for full cells or battery, more efficient solar cells using nanotechnology and nanomaterials for hydrogen storage full cells [1].

By using more efficient lighting or combustion system and lighter and stronger materials in the transportations sector, the reductive of energy consumptions is possible with the help of nanotechnology. LED and QCAs could broad to a strong reduction of energy consumption for illumination. Nanotechnology could, help increase the efficiency of light conversion by using nanostructure. The degree of efficiency of the internal combustion engine is about 30-40% at the amount and it could improve combustion by designing specific catalyst with maximized surface area [8].

The production of energy by means of nanotechnology will not harm to our environrnent. Many nanostructure materials like nanotubes, zeolite or alienates and reduction of combuston engine pollutants by porous filters are under investigation for this purpose.

The use of batteries with higher energy content or the use of rechargeable batteries or supercapacitors with higher rate of recharging using nanomaterials could be helpful for the battery disposal problem.

4. Computer and Communication

There are enormous applications in computers to increase mernory'and speed. It is said that Computers will run fast, Nano-RAM is itself a part of computer used for memory storage. Both GMR and TMR effect can be used to create a non-volatile main memory for computers and it is so called MRAM [8].

The electronic devices have been continuously decrease in size during the last century starting with meter sized vaccum valve tubes of the early 1930s and 1940s through millimetre sized transistors in the 1960s to micrometer sized integrated circuits in the 1970s and 80s. The micro-electronics has also undergone relentless miniaturization during the past 25 years, leading to dramatic improvements in the computational capacity and speed, but the end of that road is fast approaching and scientists and engineers have been investigating another promising avenue. Their nanometre size and their ability to generate as electrical response to light may help the wavy to the development of molecular scales electronic devices for communication, data processing and sensor applications [10].

Broadband communication is a very essential part of the majority of the world's everyday life and can define to have anything to do with electro-magnetic frequencies. Broadband includes audio, video and even 3D imagines. Electronically transmitting intelligence surveillance and reconnceissance information to concerned agencies is vital in today due to danger from terrorists and in confrontation of two neighbouring countries [11].

In 1999, the ultimate UMOS transmission developed for electronics and information. The MOSFET transistor with a diameter of 18nm. This was almost one tenth the size of the smallest transistor in 2003(130nm), 2004(90nm), 2005(65nm) and 2007(45nm). It enabled the theoretical integration of seven billion junctions on a 01 coin, However the CMOS transistor which was created In 1999 was not a

simple research experiments to study how CMOS technology functions, but rather a demonstration of how this technology functions now that we ourselves getting ever closer to working on a scale [6].

5. Others

An inevitable use of nanotechnology will be in heavy industry lighter and stronger materials will be of immense use to aircraft manufacturer. Spacecraft will also benefit where weight is a factor, Nanotechnology helps to reduce the size of equipments used, and Nanotechnology is lowering the mass of super capacitors that will be used to give power to assistive electrical motor for launching heavy gliders of flat land to thermal chasing altitudes. By the use of nano-technology products of refineries like steel and aluminium will be able to remove any impurities in the materials they create. Lighter and stronger material will be useful for creating vehicles that are both faster and safer. Nanocar is also based on such technology, Combustion engine will also benefit from parts that are more hard wearing and more heat resistant.

Nanosize titanium di-oxide is used in cosmetics, sun screens, creams and lotions which become more durable may look with different colour depending upon the nanosized materials [9].

CONCLUSION

Nanotechnology can be applied in production, processing, safety and packaging of food, Nanocomposites would increase or decrease gas permeability of different filters. It could be used boosting food production. The use of nanosized fibres makes water and stain - repellent or wrinkle free. Textiles with nanotechnological finish can be washed less frequently and at lower temperature [8]. Cloths can block chemical and biological weapons for touching the skin. It can help detecting narcotics and finger prints of suspects in crime. It may be used to convert the sunlight into power cleaning the pond water for drinking, creating sensors in the form of bio-chip to be planted in human body [9] .

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