# Nanotechnology-Introduction and its Present and Future Applications

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# ABSTRACT

The branch of Technology that deals with dimensions and tolerances of less than 100 nm size of particle is called nanotechnology. Nanotechnology is manipulation of matter on an atomic, molecular and supramolecular scale. A more generalized description of Nanotechnology was subsequently established by the National Nanotechnology Initiative which defines nanotechnology as the manipulation of matter with at least one dimension sized from 1 to 100 nm. This definition reflects the fact that quantum mechanical effects are important at this Quantum realm scale and so the definition shifted from particular technological goal to a research category inclusive of all types of research and Technology that deals with the special properties of matter which occur below the given size threshold. Because of variety of potential applications Governments have invested billions of dollars in nanotechnology research. Scientist currently debate the future implications of Nanotechnology. It may be able to create many new materials and devices with vast range of applications such as in nanomedicine, nanoelectronics, biomaterials energy production and consumer products. On the other hand nanotechnology raises many of the same issues as any new technology including concerns about the toxicity and environmental impact of nanomaterial.

# **INTRODUCTION**

**How nanomaterial works** :Everything when miniaturized to the sub-100 nm scale, has new properties. World of Nanotechnology is so small that we can't see it even with a light microscope. It is so new that no one is really sure what will come of it. Currently scientists find two Nano size structures of particular interest- nanowires and carbon nanotubes. Nanowires are wires with very small diameter usually of the order of 1 nanometre. Scientist hopes to use them to make tiny transistors for computer chip and other electronic devices. Carbon nanotubes are Nanosize cylinder of carbon atoms. It is in the form of hexagonal ringsof carbon atoms. These sheets can be rolled by various ways. Properties of the material depend on the manner of rolling. It can be hundreds of times stronger then Steel but six times lighter. These can be used to make cars and airplanes for better fuel efficiency. Carbon nanotubes can also be effective semiconductor hence can be used in microphones and other electronics. Carbon nanotube papers have many important applications such as in catalysis, in filtration, capacitor and battery electrode etc.

# **INFLUENCE ON CONSUMER PRODUCTS**

Nano Technology has been a boon for the consumer goods manufacturers and is been contributing not only by reducing the cost of acquisition but also quality, durable, high performance products. Nano Technology has now been widely used in different sectors i.e. be it eyewear, textile, sports, medical, telecom, etc.

At present there are numerous products in the market in which nanotechnology has been used. This technology improves products in various manners. Different approaches that are used in the production of Nano products are decreasing weight and increasing strength. 'Strengthening structures of materials' suggest an approach for plastics, steel, concrete and even fabric by using nanotechnology which increases the strength while decreases the weight of the product at the same time. Nanoparticles-nanotubes and Nano fibers can be considered as the most important option to strengthen the structure of composites, decreasing size and reducing energy consumption.

The Global trend in the production of electronic devices is in a way that works to reduce the size of equipment and to increase speed and efficiency at the same time. So scientists are working on the implementation of Nano structures such as carbon nanotubes and nanowires as the connector in various electrical devices. Nanotechnology has decreased the size of chips and large number of transistors is put on a single chip by using nanotechnology. This decreases the size and energy consumption. Nano composites and Nano alloys are produced in order to absorb heat created in the small space. Improving efficiency in many products such as monitors, nanotechnology has taken the place resulting in the improvement of the products. TV containing Quantum dots have been presented to the markets which have a great difference in the number and accuracy of colour in comparison with the conventional technology.

Nanomaterial's when added to the surface of the glass or fabric new behavior such as self-cleaning can be introduced which improves the efficiency of the existing product, making it smart with the help of nanotechnology. Many Industrial Products have become smart.

# UTILITY OF NANO TECHNOLOGY

#### NANO TECHNOLOGY IN TEXTILES

The wrinkle resistant and stain repellent fabrics have been prepared by attaching molecular structures to cotton fibers by few companies like Nanotex Textiles with Nano technological finish. These cloths can be washed less frequently and at low temperature. High performance functional clothing is an increasingly important feature of the workplace. Nanotechnology has been used to integrate tiny carbon particles membrane to the cotton cloths and guarantee full surface protection from electrostatic charges for the weareravailable which makes clothes water repellent a wrinkle free the wind proof and wind proof and waterproof properties can be obtained by the use of Nano fibers.

# NANO TEHNOLOGY IN SPORTS

Carbon nanotubes are used to manufacture tennis rackets. Such rackets are flex resistant, more rigid and long lasting. Tennis balls are made by coating the inner core of the ball with clay polymer Nano composites. Such tennis balls have twice the lifetime of conventional balls.

# NANO TECHNOLOGY IN SUNSCREEN

The traditional chemical UV protection approach suffered from its poor long term stability. A sunscreen based on mineral nanoparticles such as Titanium dioxide offer several advantages over conventional sunscreens. Titanium dioxide nanoparticles have a comparable UV protection property as the bulk material but does not cause the cosmetically undesirable whitening as the particle size is very-very small.

#### SUNGLASSES

The first sunglasses using protective and anti-reflective ultra-thin polymer coating are in the market. For optics, nanotechnology also offers scratch resistant coatings based on Nano composites. These coatings are transparent, ultra-thin, simple care, well suited for daily use and the price is reasonable for the durability

#### **SENSORS TO MONITOR BODY FUNCTIONS**

Modern technology including nanotechnology could provide features like sensors, self-repairing mechanism.

#### MEDICAL REVOLUTION BY USING NANO TECHNOLOGY

Revolution can be brought in the medical world. Drug Nano carriers, contrast imaging compounds, Nano robots and Nano sensors are the coming future materials. The diagnosis devices have also been improved, that helps in the early diagnosis of the disease.

#### CONCLUSION

Nanotechnology is giving scientists the ultimate opportunity to optimally design and create new materials. With these new opportunities comes responsibilities and it is up to all of us to use them safely yet still allow technology to develop and be useful. Of course government plays a big role in ensuring that nanotechnologies progress in a safe way.

We have a responsibility too. By keeping informed and engaged about the progression of nanotechnologies,wecan make educated contributions to future decision-making regarding the use of nanotechnology.

#### REFERENCES

- [1] StanNano, Drexler, K Eric(1986), Engines of creation. The coming era of nanotechnologyISBN-978-0-385-19973-5
- [2] Kevin Bonsor, Jonathan strickland
- [3] Rebecca Boyle, Ding Wang, Pengcheng Song, Changhong Lu, Wi Wu, Shoushan Fan
- [4] AlbertoBianco, Kostas Kostarelos, Maurizio Prato(Current opinion in chemical biology 9-6, 674-675, 2005)