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Physicist Richard Feynman, the Father of Nanotechnology

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Abstract: *Nano science and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering.*

Keywords: *Nano science*

I. INTRODUCTION

Nnomaterial's are usually considered to be materials with at least one external dimension that measures 100 nanometers or less or with internal structures measuring 100 nm or less. They may be in the form of particles, tubes, rods or fibers.

Benefits of Nanotechnology

Nanotechnology also lowers costs, produces stronger and lighter wind turbines, improves fuel efficiency and, thanks to the thermal insulation of some Nano components, can save energy. The properties of some nanomaterial's make them ideal for improving early diagnosis and treatment of neurodegenerative diseases or cancer. Nanotechnology Challenges, Risks and Ethics:-How Nanotechnology Works By: Kevin Bonsor & Jonathan Strickl and Nanotechnology Challenges, Risks and Ethics2007 [1-3]

HOW STUFF WORKS

The most immediate challenge in nanotechnology is that we need to learn more about materials and their properties at the Nano scale. Universities and corporations across the world are rigorously studying how atoms fit together to form larger structures. We're still learning about how quantum mechanics impact substances at the nanoscale.Because elements at the Nano scale behave differently than they do in their bulk form, there's a concern that some nanoparticles could be toxic. Some doctors worry that the nanoparticles are so small, that they could easily cross the blood-brain barrier, a membrane that protects the brain from harmful chemicals in the bloodstream. If we plan on using nanoparticles to coat everything from our clothing to our highways, we need to be sure that they won't poison us. Government of India's policies for nanotechnology: The Government of India launched the Nano Mission in 2007 under the Department of Science and Technology. The Ministry of Science and Technology allocated up to Rs 1000 crores to this mission to fulfill its following objectives:

Basic Promotion of Nanotechnology Infrastructure Development Establishment of R&D in Nano science Application Establishment of Development Centre for Nano science Human Development in NanotechnologyInternational CollaborationsIndia has been able to rank amongst the top 5 countries in the world for Scientific Publications in Nano science& Technology due to the efforts led by the Nano Mission. The Nano Mission has established national dialogues to promote R&D in the development of standards for nanotechnology and for laying down a National Regulatory Framework Road-Map for Nanotechnology (NRFR-Nanotech). Nanotechnology (UPSC Science and Technology) Nanotechnology (also called nanotech) is a technology that involves the manipulation of matter on atomic, molecular, and supramolecular scales. This includes particles of a scale of 1 to 100 nanometers. [4-7]

The invention of the Atomic Force Microscope (AFM) made it possible for nanotechnology to become reality. Nanotechnology has come a long way since then and now affects many industries. It is an interdisciplinary field converging many streams of engineering and science.

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This technology grew beyond boundaries in this century, because of its quantum size and variety of applications in medical science, space, telecommunications, food processing, and environmental protection fields. Nanotechnology promotional activities are carried out as a part of the Nano Science and Technology Initiative (NSTI).Why is nanotechnology needed in the future? Image result for why we need nanotechnology

In the future, nanotechnology could also enable objects to harvest energy from their environment. New Nano-materials and concepts are currently being developed that show potential for producing energy from movement, light, variations in temperature, glucose and other sources with high conversion efficiency.[8-10]

The history of nanotechnology traces the development of the concepts and experimental work falling under the broad category of nanotechnology. Although nanotechnology is a relatively recent development in scientific research, the development of its central concepts happened over a longer period of time. The emergence of nanotechnology in the 1980s was caused by the convergence of experimental advances such as the invention of the scanning tunneling microscope in 1981 and the discovery of fullerenes in 1985, with the elucidation and popularization of a conceptual framework for the goals of nanotechnology beginning with the 1986 publication of the book Engines of Creation.

Nanotechnologies are attracting increasing investment from governments and industry around the world. Total global spend is thought to be around $6.25 billion at present, but this is set to rise. The USA's 21st Century Nanotechnology Research and Development Act (2003) allocated almost $3.7 billion to fund nanotechnologies during 2005-2008. This compares with just $750 million spent in 2003. Between 2001 and 2003, the Japanese Government doubled its nanotechnology funding to $800 million. Within Europe, about $1.25 billion is currently spent on nanotechnology research and development per annum, and the UK Government has allocated about $81.9 million per year from 2003 to 2009.

Electronics

Carbon nanotubes are close to replacing silicon as a material for making smaller, faster and more efficient microchips and devices, as well as lighter, more conductive and stronger quantum nanowires. Grapheme's properties make it an ideal candidate for the development of flexible touchscreens.

Energy-

A new semiconductor developed by Kyoto University makes it possible to manufacture solar panels that double the amount of sunlight converted into electricity. Nanotechnology also lowers costs, produces stronger and lighter wind turbines, improves fuel efficiency and, thanks to the thermal insulation of some Nano components, can save energy.

Biomedicine-

The properties of some nanomaterial's make them ideal for improving early diagnosis and treatment of neurodegenerative diseases or cancer. They are able to attack cancer cells selectively without harming other healthy cells. Some nanoparticles have also been used to enhance pharmaceutical products such as sunscreen.

Environment: -

Air purification with ions, wastewater purification with Nano bubbles or Nano filtration systems for heavy metals are some of its environmentally-friendly applications. Nano catalysts are also available to make chemical reactions more efficient and less polluting.

Food:-

In this field, Nano biosensors could be used to detect the presence of pathogens in food or Nano composites to improve food production by increasing mechanical and thermal resistance and decreasing oxygen transfer in packaged products.

Textile: -

Nanotechnology makes it possible to develop smart fabrics that don't stain nor wrinkle, as well as stronger, lighter and more durable materials to make motorcycle helmets or sports equipment.

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II. FUTURE

NANOTECHNOLGY IN THE FUTURE

There are bright and dark spots in the future of nanotechnology. On the one hand, the sector is expected to grow globally, driven by technological advances, increased government support, increased private investment and growing demand for smaller devices, to name a few. However, the environmental, health and safety risks of nanotechnology and concerns related to its commercialization could hamper market expansion.

III. CONCLUSION

The United States, Brazil and Germany will lead the nanotechnology industry in 2024, with an important presence in the Top 15 Asian countries such as Japan, China, South Korea, India, Taiwan and Malaysia. The cosmetics sector will climb positions stealing third place from the biomedical sector in a ranking that will be led by electronics and energy, as it is now.

In March 2023, Maharashtra, a constituent state of the Union of India, decided its own nanotechnology policy. Accordingly, in the field of chemical fertilizers in the agricultural sector, preferably chemical fertilizers with Nano technology i.e. instead of big bags, the said chemical fertilizers can be available in small bottles. This scheme will be very easy and economical to take the farmers to the farm. In short, the expansion of Nano technology is increasing at the government level. At the same time, its use in various fields is also increasing rapidly.

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