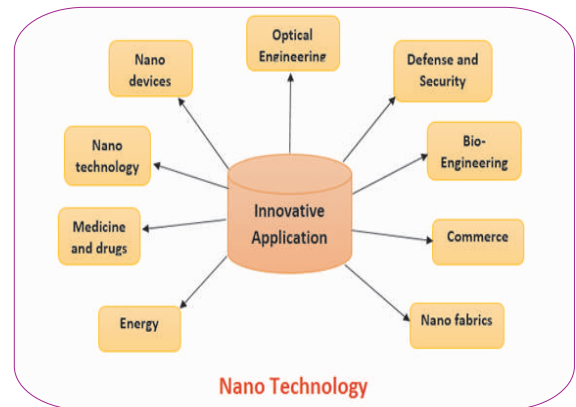




NANOTECHNOLOGY AND ITS APPLICATIONS IN MEDICINE

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ABSTRACT:

Nanotechnology is the investigation of to a great degree little structures, having size of 0.1 to 100 nm. Nano prescription is a generally new field of science and innovation. Brief clarification of different sorts of pharmaceutical nano frameworks is given. Grouping of nano materials in view of their measurements is given. An utilization of Nanotechnology in different fields, for example, wellbeing and prescription, hardware, vitality and condition, is examined in detail. Uses of nano particles in medicate conveyance, protein and peptide conveyance, growth are clarified. Utilizations of different nano frameworks in growth treatment, for example, carbon nano tube, dendrimers, nano precious stone, nano wire, nano shells and so on are given. The progression in nano innovation helps in the treatment of neuro degenerative scatters, for example, Parkinson's malady and Alzheimer's sickness. Utilizations of nano innovation in tuberculosis treatment, the clinical use of nanotechnology in agent dentistry, in ophthalmology, in surgery, perception, tissue designing, anti-toxin resistance, invulnerable reaction are examined in this article. Nano pharmaceuticals can be utilized to identify maladies at significantly prior stages.

KEYWORDS: Nano devices; Nano ematerial; Nano medicine; Nano pharmaceuticals; Drug delivery.

INTRODUCTION

Progression in the field of nanotechnology and its applications to the field of solutions and pharmaceuticals has changed the twentieth century. Nanotechnology [1] is the investigation of to a great degree little structures. The prefix "nano" is a Greek word which signifies "overshadow". "Nano" implies little or scaled down size. Nanotechnology is the treatment of individual atoms, or mixes into structures to create materials and gadgets with exceptional properties. Nanotechnology include work from top down i.e. decreasing the measure of extensive structures to littlest structure e.g. photonics applications in nano electronics and nano designing, top-down or the base up, which includes changing individual particles and atoms into nanostructures and all the more intently looks like science.

Nanotechnology manages materials in the extent of 0.1 to 100 nm; notwithstanding it is likewise inborn that these materials should show diverse properties, for example, electrical conductance substance reactivity, attraction, optical impacts and physical quality, from mass materials because of their little size.

Nanotechnology chips away at issue at measurements in the nanometer scale length (1-100 nm), and in this way can be utilized for a wide scope of utilizations and the making of different sorts of nano materials and nano gadgets.

HISTORY OF NANOTECHNOLOGY

The advancement in the field of nanotechnology begun in 1958 and the different phases of improvement have been abridged

Year	Development in nanotechnology
1959	R. Feynman initiated thought process
1974	The term nanotechnology was used by Taniguchi for the first time.
1981	IBM Scanning Tunneling Microscope
1985	"Bucky Ball"
1986	First book on nanotechnology Engines of Creation published by K. Eric Drexler, Atomic Force Microscope
1989	IBM logo was made with individual atoms
1991	S. Iijima discovered Carbon Nano tube for the first time.
1999	1st nano medicine book by R. Freitas "Nano medicine" was published
2000	For the first time National Nanotechnology Initiative was launched
2001	For developing theory of nanometer-scale electronic devices and for synthesis and characterization of carbon nanotubes and nano wires, Feynman Prize in Nanotechnology was awarded
2002	Feynman Prize in Nanotechnology was awarded for using DNA to enable the self-assembly of new structures and for advancing our ability to model molecular machine systems.
2003	Feynman Prize in Nanotechnology was awarded for modeling the molecular and electronic structures of new materials and for integrating single molecule biological motors with nano-scale silicon devices.
2004	First policy conference on advanced nanotech was held. First center for nano mechanical systems was established, Feynman Prize in Nanotechnology was awarded for designing stable protein structures and for constructing a novel enzyme with an altered function.
2005-2010	3D Nano systems like robotics, 3D networking and active nano products that change their state during use were prepared.
2011	Era of molecular nano technology started

Table 1: Periodical development in nanotechnology.

Classification of Nano Materials

Nano materials can be ordered measurement astute into following classifications:

Classification Examples

- Nano poles, nano wires have measurement under 100 nm.
- Tubes, strands, platelets have measurements under 100 nm.
- Particles, quantum spots, empty circles have 0 or 3 Dimensions < 100 nm.

On the premise of stage creation, nano materials in various stages can be named,

- The nano material is called single stage solids. Crystalline, formless particles and layers are incorporated into this class.
- Matrix composites, covered particles are incorporated into multi-stage solids.
- Multi-stage frameworks of nano material incorporate colloids, air gels, Ferro liquids, and so forth.

Manufacturing Approaches

The two major approaches to get nano materials are - one is the base up and the other is top down approach. Base up deliver parts which are made of single particles, and covalent strengths hold them together that are far more grounded than the powers that hold together full scale segments. Colossal measure of data could be put away in gadgets develop from the base. For instance, utilization of AFM, fluid stage methods in light of opposite micelles, solgel preparing, and synthetic vapor testimony (CVD), laser pyrolysis and atomic self-gathering use base up approach for nano scale material assembling.

Top assembling includes the development of parts through strategies, for example, cutting, cutting and

shaping and because of our impediments in these procedures exceptionally progressed nano gadgets are yet to be produced. Laser removal, processing, nano-lithography, aqueous strategy, physical vapor affidavit and electrochemical technique (electroplating) utilizes top down approach for nano-scale material assembling.

Each component of intermittent table can be used in nanotechnology relying on the objective material which somebody will create go from nano pharmaceutical and goes up to nano concrete by means of nano gadgets. Nanotechnology gives us the opportunity to integrate nano scale building hinders with control on estimate, arrangement and so forth. Materials assembling will be upset by additionally collecting into bigger structures with planned properties. Without machining, metals, polymers, pottery and so on can be fabricated at correct shape.

Nanotechnology can profit substance catalysis because of the to a great degree substantial surface to volume proportion. The different uses of nanoparticles in catalysis extend from power module to exhaust systems and photocatalytic gadgets. It is additionally critical for the creation of chemicals. Present day upheaval in catalysis is because of the accessibility of boundless business amounts of zeolites.

APPLICATIONS OF NANOTECHNOLOGY

The different fields that find potential applications of nanotechnology are as follows:

- a. Health and Medicine
- b. Electronics
- c. Transportation
- d. Energy and Environment
- e. Space exploration

NANOTECHNOLOGY IN HEALTH AND MEDICINE

Indeed, even today different malady diabetes, development, Parkinson's affliction, Alzheimer's disease, cardiovascular sicknesses and different sclerosis and furthermore different sorts of real red hot or overwhelming contaminations (e.g. HIV) constitute a high number of honest to goodness and complex ailments which are speaking to an essential issue for the humankind. Nanomedicine is an utilization of nanotechnology which works in the field of wellbeing and medication. Nano-medication makes utilization of nano materials, and nano electronic biosensors. Later on, nano prescription will profit atomic nanotechnology. The therapeutic region of nano science application has many anticipated advantages and is possibly profitable for every single human race.

With the assistance of nano pharmaceutical early location and counteractive action, enhanced conclusion, legitimate treatment and follow-up of maladies is conceivable. Certain nano scale particles are utilized as labels and names, natural can be performed rapidly, the testing has turned out to be more delicate and more adaptable. Quality sequencing has turned out to be more proficient with the development of nano gadgets like gold nano particles, these gold particles when labeled with short fragments of DNA can be utilized for recognition of hereditary grouping in an example.

With the assistance of nanotechnology, harmed tissue can be replicated or repaired. These alleged falsely fortified cells are utilized as a part of tissue building, which may upset the transplantation of organs or fake inserts.

Progressed biosensors with novel components can be created with the assistance of Carbon nano tubes. These biosensors can be utilized for astrobiology and can toss light on consider causes of life. This innovation is additionally being utilized to create sensors for tumor diagnostics. In spite of the fact that CNT is idle, it can be functionalized at the tip with a test atom. Their examination utilizes AFM as a trial stage.

- i. Test particle to fill in as signature of leukemia cells recognized.
- ii. Current stream because of hybridization will be through CNT terminal to an IC chip.
- iii. Model biosensors catheter advancement.

Nanotechnology has made astounding commitment in the field of stem cell research. For instance, attractive nanoparticles (MNPs) have been effectively used to segregate and gathering immature microorganisms. Quantum specks have been utilized for sub-atomic imaging and following of undifferentiated

organisms, for conveyance of quality or medications into immature microorganisms, nano materials, for example, carbon nano tubes, fluorescent CNTs and fluorescent MNPs have been utilized. One of a kind nanostructures were intended for controllable direction of expansion and separation of undeveloped cells is finished by outlined one of a kind nano structures. Every one of these advances accelerate the improvement of undeveloped cells toward the application in regenerative pharmaceutical [3]. The current utilizations of nanotechnology in undeveloped cell inquire about guarantees to open new roads in regenerative solution. Nanotechnology can be a significant instrument to track and picture immature microorganisms, to drive their separation into particular cell heredity and eventually to comprehend their science. This will ideally prompt undifferentiated cell based therapeutics for the counteractive action, finding and treatment of human infections.

Nano gadgets can be utilized as a part of foundational microorganism look into in following and imaging them. It has its applications for fundamental science and in addition translational drug. Immature microorganisms can be balanced by blending of nano bearers with natural atoms. Nano gadgets can be utilized for intracellular get to and furthermore for insightful conveyance and detecting of biomolecules. These advances have an incredible effect in undifferentiated cell microenvironment and tissue designing examinations and have an extraordinary potential for biomedical applications.

MEDICAL USE OF NANO MATERIALS

Nano medication is a decently new field of science and development. By working together with regular particles at nano scale, nanotechnology broadens the field of research and application. Relationship of nano contraptions with bio particles can be appreciated both in the extracellular medium and inside the human cells. Operation at nano scale grants abuse of physical properties not exactly the same as those seen at little scale, for instance, the volume/surface extent.

Two sorts of nano arrangement that have recently been attempted in mice and are reckoning human trials; use of gold nano shells to help dissect and cure tumor, and the use of liposome as counter acting agent adjuvants and as vehicles for steady transport. So also, medicate detoxification is additionally another application for nano pharmaceutical which has been utilized effectively in rats. Therapeutic innovations can make utilization of littler gadgets are less intrusive and can be embedded inside the body, and their biochemical response times are substantially shorter. When contrasted with run of the mill sedate conveyance nano gadgets are speedier and more touchy.

CONCLUSION

Nano materials have expanded surface zone and nano scale impacts, consequently utilized as a promising instrument for the headway of medication and quality conveyance, biomedical imaging and indicative biosensors. Nano materials have one of a kind physicochemical and natural properties when contrasted with their bigger partners. The properties of nano materials can significantly impact their connections with bio atoms and cells, because of their impossible to miss estimate, shape, concoction arrangement, surface structure, charge, dissolvability and agglomeration. For instance, nano particles can be utilized to create remarkable pictures of tumor locales; singlewalled carbon nanotubes, have been utilized as high-effectiveness conveyance transporters for biomolecules into cells. There is a splendid future to nano innovation, by its converging with different advances and the consequent development of mind boggling and imaginative mixture advances. Science based advancements are entwined with nanotechnology nanotechnology is now used to control hereditary material, and nano materials are now being fabricated utilizing organic parts. The capacity of nanotechnology to design matter at the littlest scale is changing ranges, for example, data innovation intellectual science and biotechnology and is prompting new and interlinking these and different fields. By additionally inquire about in nanotechnology, it can be valuable for each part of human life. Pharmaceutical, regenerative solution, undifferentiated cell research and nutraceuticals are among the main parts that will be altered by nanotechnology developments.

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