

A Review Paper on Nano Technology

Chetan Prakash Maru¹ Prof. Sanjiv Kumar²

¹B.Tech Scholar ²Head of Dept.

^{1,2}Department of Electronics & Communication Engineering

^{1,2}Vivekananda Institute of Technology, Jaipur

Abstract— Nanotechnology is the branch engineering at the molecular scale. Nano-technology covers both current work and concepts that are more advanced. Nano-technology is sometimes referring to as a general-purpose technology. Nano-technology will offer better built and design, cleaner, safer, and smarter products for the home and industries, for communications, for medicine, for transportation, for agriculture in general. A better description of nanotechnology was given by the National Nanotechnology Initiative (NNI); it defines nano-technology as the manipulation of matter with dimension sized from 1 to 100 nanometers. This definition of NNI define the fact that quantum mechanical effects are important at this quantum scale, and so the definition shifted from a particular technological to a research category including all types of research and technologies which deals with the special properties of matter. Nano-technology is therefore see the plural form of the "nanotechnologies" as well as "nanoscale technologies" to define the broad range of research, development and applications whose common attribute is size. Due the variety of potential applications (industrial, military, home, communication, agriculture), governments have invested billions of dollars in nano-technology research.

Key words: Nano Technology, NNI, AFM

I. INTRODUCTION

The definition of the nanotechnology is the ability to construct items from the bottom up and top down, using techniques and tools being developed today to make complete, high performance products in nanoscale. Nano-technology is in the dimension range from 1 to 100 nanometer, this definition used by the National Nanotechnology Initiative (NNI) in the US. Several phenomena define as the size of the system decreases. It includes statistical mechanical effects and quantum mechanical effects, for example "quantum size effect" where the electronic properties of solids are altere.

The basic diagrams of nanotechnology are shown below:

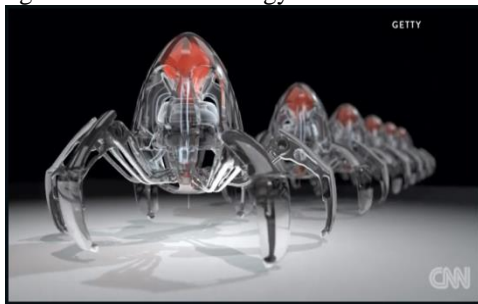


Fig. 1: nanobots

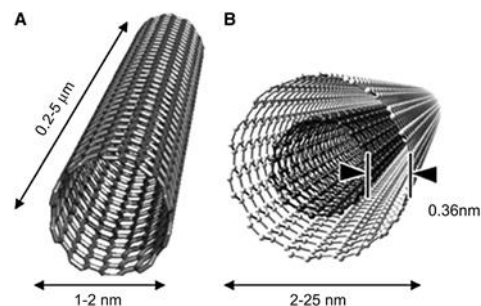


Fig. 2: nanotubes

II. TOOLS AND TECHNOLOGIES OF NANO TECHNOLOGY

Different type of tools used in the field of nanotechnology for scanning purpose. First one is the APM which is known as the atomic force microscope and the second is the STM which is known as the scanning tunneling microscope. Both microscopes are used for the scanning of the nano structure. The atomic force microscope is the type of scanning probe microscope (SPM). It is used to measure the properties, like height, friction, magnetism etc with the help of probe. The atomic force microscope (AFM) is measure the force between the probe and the sample. The probe is a sharp tip.

The diagram of the AFM is shown below:

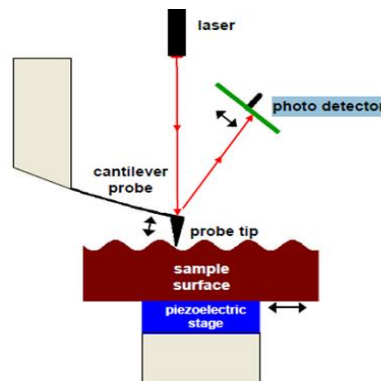


Fig. 3: AFM

III. CURRENT RESEARCH AND APPLICATIONS OF NANO TECHNOLOGY

Till now in the nanotechnology developed different device which is used in different fields and sector and reduce the human effort and do the work with more precisely. In the field of material sciences nanotechnology developed powder, coatings, and carbon nonmaterial and carbon Nano fabrics. In the field of energy nanotechnology do the research on solar power and photovoltaic, hydrogen fuel cells, LED white light. Talking about in the field of medical or biotech nanotechnology done the research on the genomics, proteomics, and lab on a chip, carbon nanotubes and bucky balls. In the field of electronics MRAM, DRAM, Q-Dots and Q-bits are the current researchs. If we talking about the devices lithography, Dip pen lithography, AFM and MEMS are the latest researchs.

Carbon nanotubes- it is basically the allotropes of the carbon having cylindrical structure. Its length to diameter ratio is around 132,000,000:1. Carbon nanotube is the member of the fullerene structural family and it is thermally and electrically conductive. Its electrical resistance changes when other molecules attach to the carbon atoms. It make helps in developing sesors.

The structure of the carbon nanotube is shown below:

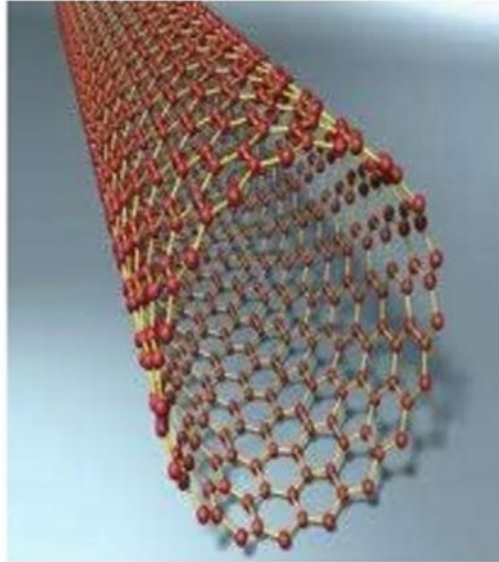


Fig. 4: carbon nanotubes

It is used in electric cables, wires, solar cells and in medical field.

A. Nanobots:

The dimension of the nanobots is close to the nanometer and it capable to counting specific molecules present in chemical sample. Nanobots are microscopic in size so it would probably necessary for very large numbers of them to work together to perform microscopic tasks. Nanobots are used in the detection of the toxic component in environment, drug delivery and in biomedical instruments.

The structure of the nanobots is shown below:



Fig. 5: nanobots

B. Approaches in nanotechnology:

In nanotechnology two approaches are used kwon as top-down approach and bottom-up approach. In bottom-up approach different materials and devices are constructed from molecular components of their own. They chemically assemble themselves.



Fig. 6: bottom-up approach

In top down approach nano objects and materials are created by larger entities without bouncing, or building something by starting with a larger piece and carving away material (like a sculpture).

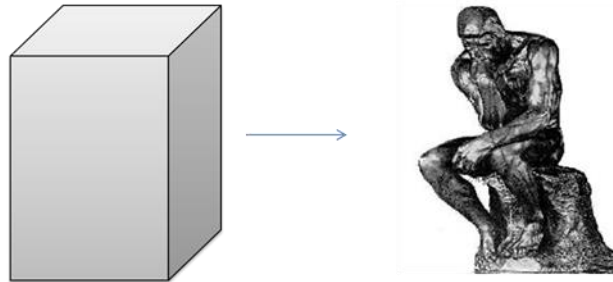


Fig. 7: top-down approach

IV. ADVANTAGES

- 1) Carbon nano tubes are having high strength ratio so it helps in creating light weight spacecrafts.
- 2) Carbon nano tubes easily penetrate membrane of cell well so it is used in cancer treatment.
- 3) The length of robots is in few nanometers, called as nanobots and nano-factories could help to construct novel materials and objects.
- 4) Nanotubes and nanoparticles, both are tubes and particles only a few atoms across them, and aerogels, materials composed from very light and strong materials with insulating properties, could have the way for new techniques and superior products.
- 5) Nanotechnology makes less pollution in environment.
- 6) Its production cost is low.
- 7) It is a technology itself.
- 8) Nanotechnology has Mass production in food & consumables.

V. DISADVANTAGES

- 1) The main Disadvantage of the nano-technology is that world is facing because of nanotechnology have a lack of employment in the fields of farming, manufacturing and industrial sector.
- 2) Because of the huge development in the field of nanotechnology, nanotech devices have taken place of human to work with faster and accurate which has lesser the importance of men power in the fields of practical work.
- 3) Nanotechnology has increased risk to our health and environment, because of the small size of nano-particles causes inhalation problem and also causes many other fatal diseases by inhaling which contains nano particles can damage our lungs.

REFERENCES

- [1] <http://www.nano.gov.in/>
- [2] www.wiki.com
- [3] www.seminaronly.com
- [4] Saini, Rajiv; Saini, Santosh; Sharma, Sugandha(2010). "Nanotechnology: The Future Medicine". Journal of Cutaneous and Aesthetic Surgery 3 (1): 32–33
- [5] "Nanotechnology: Drexler and Smalley make the case for and against 'molecular assemblers'". Chemical & Engineering News (American Chemical Society) 81 (48): 37–42. 1 December 2003.