

**PAPER**

**PRESENTATION ON**

**NANOTECHNOLOGY**

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## **INTRODUCTION**

“Imagine a world in which microscopic procreating robots are sent into the human body with the mission of

detecting cancer cells, disassembling them and sending them out into the bloodstream as a waste products. Since fiction or reality?

In 1959, Richard Feynman made a statement " there is a plenty of room at the bottom". He brought forth-new concept based on study devoted to manipulating smaller and smaller units of matter.

Until 1974, the materials were generally investigated at micrometer level, which was known as micro technology. In 1974 the term nano technology was coined by norio Taniguchi at the university of Tokyo.

In 1986, MIT researcher Eric Drexler wrote his much published book "Engine of Creation" which took nano technology to the stage of general investigations of multiple interests.

## **NANOTECHNOLOGY**

### **The Term**

The term nano is derived from Greek word, which means dwarf. Nano means billionth part. A nano meter is one

billionth of a meter. An atom is approximately one third of nano meter.

### **Definitions**

We find various definitions for nano technology. One definition is as follows. " Nano technology is a branch of engineering that deals with design and manufacture of extremely small electronics circuits and mechanical devices built at molecular level of matter". The institute of nano technology in the UK expressed it as " Science and Technology where dimesions and tolerance in the range of 0.1 nano meter to 100nm play a critical role".

### **Importance of nano: Unique properties**

#### **Nanotechnology: properties**

- 
- Not only miniaturization but change in physical properties

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- Laws of quantum physics
  - Metals become harder
  - Ceramics become softer
  - Composites and alloys of a whole variety possible
  - Different interactions with light/other radiation
  - New electrical properties
  - Novel biological properties
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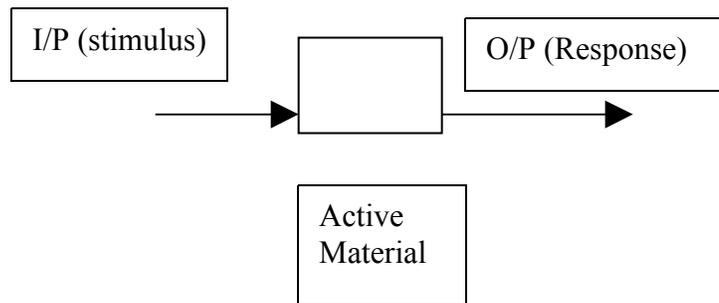
### **Smart materials**

A smart material is one which is capable of detecting a change in its environment and reacts appropriately so as to

produce desired results . The reaction may be in terms of change of shape or significant change in its physical property.

Smart materials are;

- 1.piezoelectric materials
- 2.magnetostrictive materials
- 3.Electrorheological fluids and magnetorheological fluids
- 4.shape memory alloys



### **MEMS (MICROELECTROMECHANICAL SYSTEMS)**

MEMS are the acronym for microelectromechanical systems. This is actually a result of ever-continuing pursuit of human kind for miniaturization.

“MEMS is a process technology to produce tiny integrated device or system which incorporate mechanical elements such as valves, gears, sensors, acutators along with on-chip

microcircuits to fabricate high performing, low-cost, compact engineering systems”

### **Tools used in Nanotechnology**

To manipulate at the atomic level first thing we require is the tool to see and locate the atom.

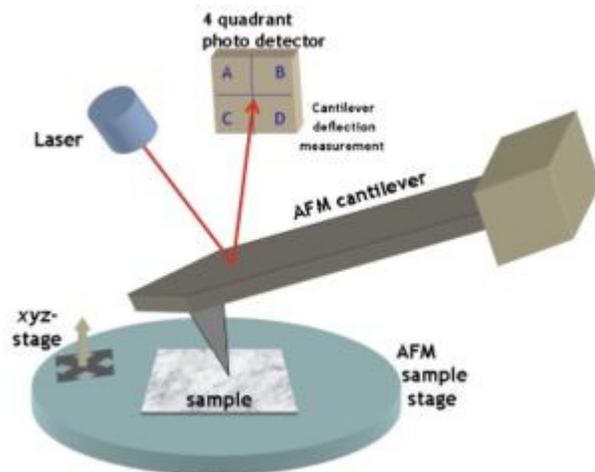
To do so we have various microscopes like Scanning Electron Microscope (SEM), Transmission Electron Microscope

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(TEM), Atomic Force microscope (AFM). Scanning Tunneling Microscope (STM).

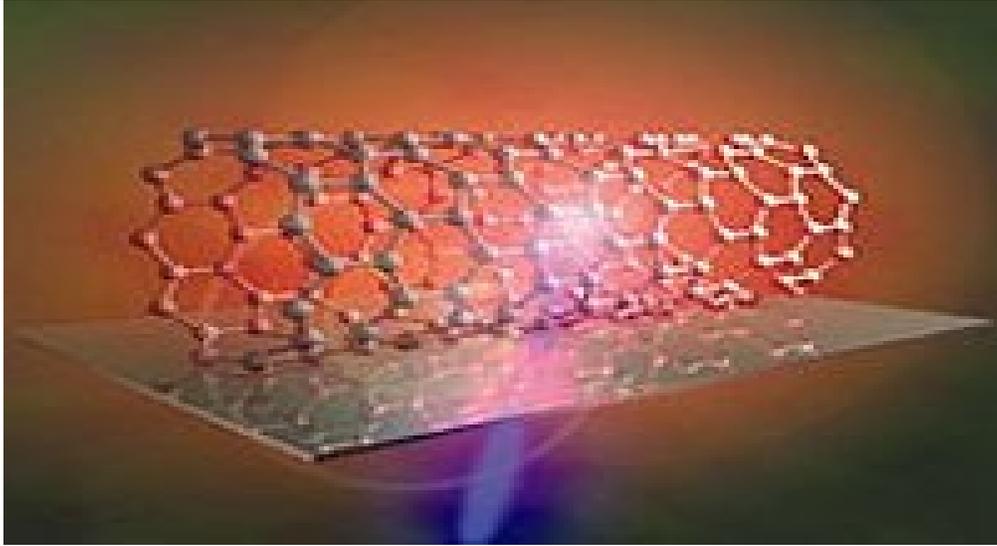
The next tool is NANOMANIPULATOR, which eventually helps us feel the individual atoms in the real environment.

The third tool is NANOTWEEZERS, The Tweezer structure can be closed with an applied electrical field like a pair of chopsticks to produce a device that grasps and moves molecules or atoms.



## NANO DEVICES

### **Nanotube**



A nano tube is a sheet of carbon atoms joined in a pattern of hexagon and rolled into a cylinder. Nano tubes are stronger ,non-reactive and can withstand high temperature .

- 1 . Nanotubes are better alternative to silicon components which will pose problems because of continuing miniaturization.
- 2 . The Nanotube has been used in a computer circuit to make logic circuits.
- 3 . Electrical properties of SWNT can be used to generate mechanical motion from electrical energy.
- 4 . The extreme sensitivity of electrical properties to presence of trace elements also enhances their potential as sensors.
- 5 . Nanotubes can act as bearings, gears and even as pumps and pistons in combination with Fullenes.

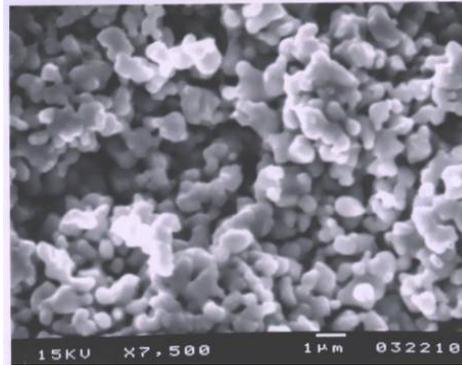
## **NANO COMPOSITES**

**THEY ARE THE TYPE OF COMPOSITE MATERIALS WITH ATLEAST ONE DIMENSION IN THE RANGE OF UPTO FEW LINES OF NANOMETER.THEY POSSES HIGH**

## **NANOTECHNOLOGY**

**PLASTICITY, HIGH RESISTIVITY AND HIGH DIFFUSIBILITY. THEY ARE USED IN BUMOERS OF CARS.**

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## **APPLICATIONS**

The MEMS technology has found ready use in developing micro sensors for control of manufacturing processes,

vehicles, and biomedical systems to micro seismometers for monitoring the earthquake phenomena.

1. Nanosensors may be integrated into a material at the production stage without distorting it , or they may be incorporated as invisible thin polymer layers on a surface when changes occurs.
2. Nanoelectronics will replace microelectronics. The components of these electronics will include molecular mimics, bio molecules and DNA, SET's. Energy may eventually be transmitted in circuits via photons rather than electrons
3. We will be able to produce faster and smaller computers.
4. Besides electronic applications it has vast scope for medicinal applications. We can have machines moving in capillaries clearing clots, stones etc
5. Internal bleedings and fractures can be treated.

**Virichip**



Using nanotechnology, researchers have developed a tiny silicon chip that acts like flypaper to trap and help rapidly identify viruses. Called the "ViriChip," the device was developed in a collaborative effort between BioForce Nanosciences Inc. of Ames, Iowa and Iowa's Des Moines University.

## **RISKS FACTORS**

**Economic disruption from an abundance of cheap products:**

**Economic oppression from artificially inflated prices:**

**Social disruption from new products and lifestyles:**

**Collected environmental damage from unregulated products:**

## **CONCLUSION**

Nanotechnology is an umbrella term that covers many areas of research. Nanotechnology enables us to do radical things in virtually

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every technological and scientific arena. It will also changes things in unpredictable and unanticipated ways.