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Nano Technology

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ABSTRACT

The discoveries, which have been emerged from the tender minds of young scientists in 20th century, had led too much innovative idea's .one such idea applying the concept of nanotechnology in the fields of nanorobots. There're two concepts of nanotechnology. They are position assembly &self-replication. Nanorobots are used in various fields Nanotechnology is smaller than micro technology. It is building with Intent and design, molecule by molecule. Nanotechnology can be created at nanoscale to perform new and improved functions. Nanotechnology is an enabler of accomplishment in a truly diverse mix of science and engineering fields. Scientist Looking for building blocks to form electronics and machines that are not much Bigger than molecules. Researches have found a way to make carbon nanowires used In Nanoelectronics, as microscopic machine parts and in materials constructed Molecule-by-molecule. This paper is mainly deals about nanomedicine and some of its applications namely nanorobots and remote sensing. Nanomedicine is the Application of nanotechnology i.e. engineering of tiny machines which is used for the Prevention and treatment of disease in human body. Nanomedicine has potential to Change medical science dramatically in twenty first century.

INTRODUCTION

Nano is a Greek prefix that defines the smallest (1000 times smaller then micrometer) natural structures. It is building with indent &design, molecule by molecule, these two things:

- Incredibly advanced extremely capable nanoscale machines & computers.
- Ordinary size objects, using other incredibly small machines called assemblers. Nanotechnology can be created at nanoscale & to perform new & improved functions.

It is going to be responsible for massive changes in the way we live, the way interact with one another & our environment.

SPECIALIZED NANOTECHNOLOGY FACILITIES & CAPABILITIES

Nanotechnology is both the means to an end-an enables of accomplishments in truly diverse mix of science & engineering field. It is a revolution in industry that deliver wave after wave of innovative products and services.

a. Molecular measuring machine (m^3)

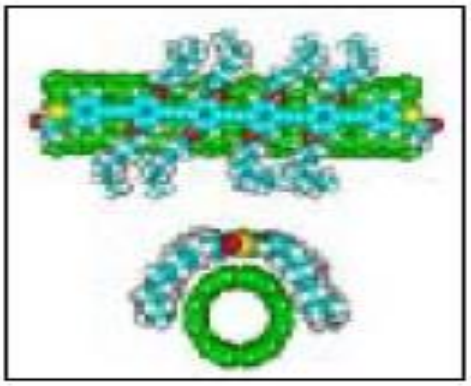
Nist conceived two –dimensional co- ordinate measuring machine can measure with nanometer level with accuracy, locations, distance and features sizes over a 50mm by 50mm area, an enormous expense in the

nanotechnology world .It uses a high – precision Inferometer.

b. Pulsed inductive Micro wave Magnetometer (PIMM)

Using PIMM, nanostuctured materials are used to record data in extremely small bits (at sizes below 160 square nm per bit), now can assess quickly the composition and growth conditions that promote high speed response, permitting the development of future magnetic memories that read and write data at sustained speeds in excess of 1 billions bits per second.

c. Carbon Wires expand Nano toolkit

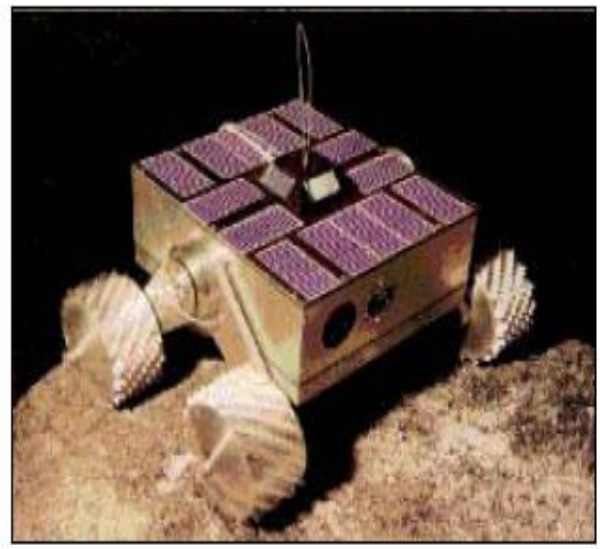


Scientists looking for building blocks to form electronics & machines that are not much bigger than molecules have garned a new tool, Japan have found a way to make carbon nanowires that measure only a few carbon atoms across. CNW could eventually be used in ultra-stronger fibers, as friction-free bearings &in space shuttle nose –cones. Carbon nanotubes are very strongly having useful electrical properties, because they are solid, and they should be even stronger than nanotubes. They could be used in nanoelectronics as microscopic machine parts, and in materials constructed molecules by molecule.

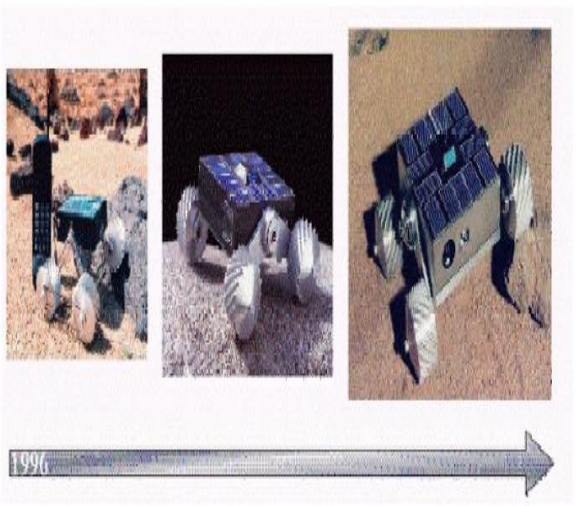
d.Nanotubes boost storage

Multiwalled carbon nanotubes to make denser, more efficient data Storage devices. It was possible to use multiwalled carbonnanotubes tips rather then silicon to write data on to a polymer film. Binary data is written by heating the polymer to make indentation that represent 1s; blank space represent 0s.nanotubes tips can be used to write more than 250 gigabytes.

NANOTECHNOLOGY AT NASA



- Advanced miniaturization is a key thrust area to enable new science and exploration missions
- Ultra small sensors, power sources, communication, navigation, and propulsion systems with very low mass, volume and power consumption are needed
- Revolutions in electronics and computing will allow reconfigurable, autonomous, "thinking" spacecraft
- Nanotechnology presents a whole new spectrum of opportunities to build device components and systems for entirely new space architectures
- Networks of ultra small probes on planetary surfaces
- Micro-rovers that drive, hop, fly, and burrow
- Collection of micro spacecraft making a variety of measurements



The Nanorover Technology Task is a technology development effort to create very small (10-100s of grams) but scientifically capable robotic vehicles for planetary exploration, which can easily fit within the mass and/or volume constraints of future missions to asteroids, comets, and Mars. The task objective is twofold:

• To create a useful rover system using current-generation technology including mobility, computation, power, and communications within a mass of a few hundred grams, and

• to advance selected technologies which offer breakthroughs in size reduction, mobility, or science return to enable complete rovers to be built with a mass well under 100 grams.

Key Technology Elements

• Miniaturization of all rover systems including science payload

• Computer/electronics design for operation without thermal enclosure and control to survive ambient temperature ranges of -125C to +125C

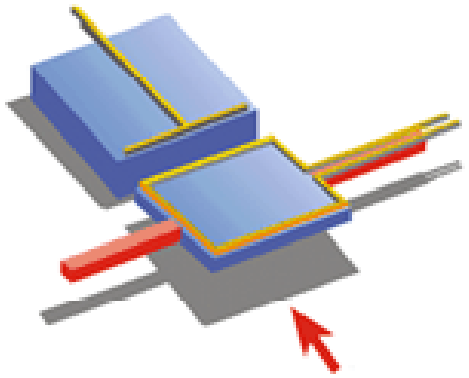
• Miniature actuator usage and control in thermal/vacuum environments

• Mobility and navigation in low-gravity (1/100,000 of Earth) environments

• Sensing and autonomous control of rover operations

NANOELECTROMECHANICALSYSTEM

NEMS converts mechanical energy in to electrical or optical signals and vice versa. The principle components are mechanical elements and transducers. Mechanical elements can be used to sense static or time-varying forces. NEMS dissipate very little energy. NEMS extremely sensitive to external damping Mechanisms, for building much type of sensors. It is used for wide range of sensing applications. Small size of NEMS also implies that have a highly localized spatial response. Driving a NEMS at Pico watt scale could cause SNR up to 10^6.

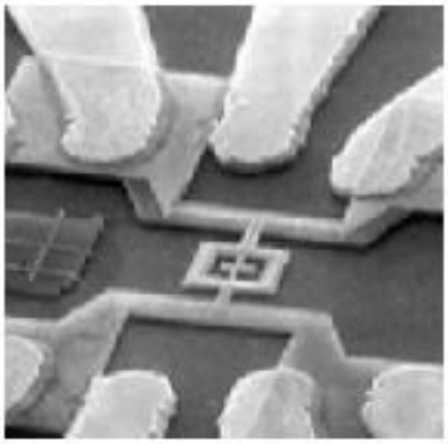


The output of an electromechanical device is the movement of the mechanical element. There are two main types of response: the element can simply deflect under the applied force or its amplitude of oscillation can change (figure 3).

Detecting either type of response requires an output or readout transducer, which is often distinct from the input one. In Coulomb's case, the readout transducer was "optical" - he simply used his eyes to record a deflection. Today mechanical devices contain transducers that are based on a host of physical mechanisms involving piezoelectric and magneto motive effects, nanomagnets and electron tunneling, as well as electrostatics and optics.

Benefits of nanomachines

Nanomechanical devices promise to revolutionize measurements of extremely small displacements and extremely weak forces, particularly at the molecular scale. Indeed with surface and bulk nanomachining techniques, NEMS can now be built with masses approaching a few attograms (10^{-18} g) and with cross-sections of about 10 nm The small mass and size of NEMS gives them a number of unique attributes that offer immense potential for new applications and fundamental measurements.



NANOMEDICINE

Nanomedicine is the application of nanotechnology (the engineering of tiny machines) to the prevention and treatment of disease in the human body. It has the potential to change medical science dramatically in the 21st century.

According to Jar off, Nanotech is capable of delivering medication to the exact location where they are needed. In addition to much fewer deaths (and disorders) from side effects, the drug would also be more potent. The drug

could also reach nearly inaccessible places that current techniques don't allow.

The most elementary nanomedical devices will be used to diagnose illness. Chemical tests exist for this purpose; nanomachines could be employed to monitor the internal chemistry of the body. Mobile nanorobots, equipped with wireless transmitters, might circulate in the blood and lymph systems, and send out warnings when chemical imbalances occur. Similar fixed nanomachines could be planted in the nervous system to monitor pulse, brain-wave activity, and other functions.

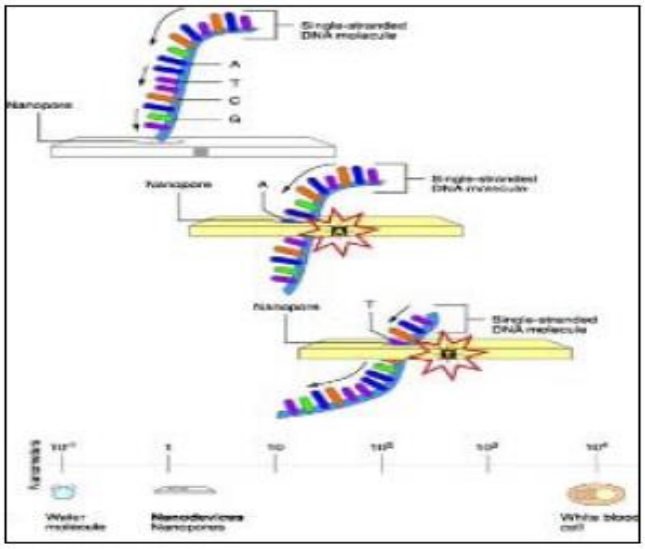
METHODS OF MEDICATION

A more advanced use of nanotechnology might involve implanted devices to dispense drugs or hormones as needed in people with chronic imbalance or deficiency states. Heart defibrillators and pacemakers have been around for some time; nanomedicine carries this to the next level down in terms of physical dimension, with the potential to affect the behavior of individual cells. Ultimately, artificial antibodies, artificial white and red blood cells, and antiviral nanorobots might be devised.

The most advanced nanomedicine involves the use of nanorobots as miniature Surgeons. Such machines might repair damaged cells, or get inside cells and replace or assist damaged intracellular structures. At the extreme, nanomachines might replicate themselves, or correct genetic deficiencies by altering or replacing DNA (deoxyribonucleic acid) molecules.

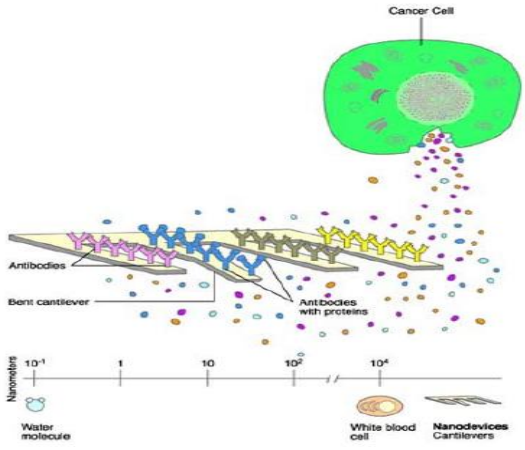
NANOPROBES

A nanoprobe can distinguish viruses by using a sensor that adheres to the coating of a non-enveloped virus or by measuring the curvature of the membrane in enveloped viruses (they are much smaller than cells.)



CANCER DETECTION AND TREATMENT

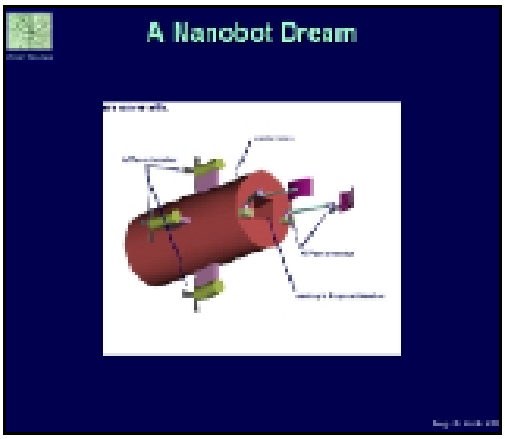
Nanotechnology can be used in detection of cancer at an early stage. Nanotechnology tools are extremely sensitive and can be used with out physically altering the cells or tissue tests and can be run on a single small device. The cantilever is a tool and when the cancer molecules bid to the cantilevers the cantilevers bends. from this, the detected from which the cancer ells are detected.



Nanotubes helps to identify DNA changes associated with cancer. Quantum dots are tiny crystals that glow when UV light stimulates them. Latex bend filled with these crystals can be designed to bind to specific DNA sequences and the cancer cells detected.

NANOROBOTS: MEDICINE OF THE FUTURE

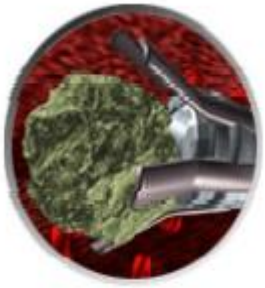
"Living organisms are naturally-existing, fabulously complex systems of molecular nanotechnology." - Dr. Gregory Fahy



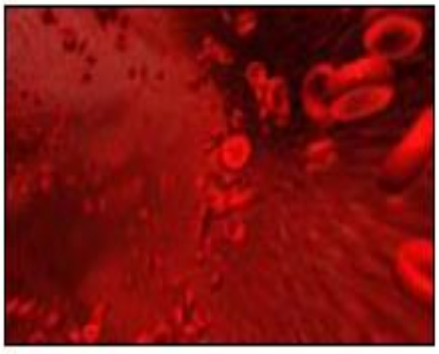
The above statement raises the interesting possibility that machines constructed at the molecular level (nanomachines) may be used to cure the human body of its various ills. This application of nanotechnology to the field of medicine is commonly called as nanomedicine.
Nanorobots are nanodevices that will be used for the purpose of maintaining and protecting the human body against pathogens. They will have a diameter of about 0.5 to 3 microns and will be constructed out of parts with dimensions in the range of 1 to 100 nanometers. The main element used will be carbon in the form of *diamond / fullerene nanocomposites* because of the strength and chemical inertness. Metabolizing local glucose and oxygen for energy can do the powering of the nanorobots. Communication with the device can be achieved by *broadcast-type acoustic signaling.*

A navigational network may be installed in the body, with station keeping navigational elements providing high positional accuracy to all passing nanorobots that interrogate them, wanting to know their location. This will enable the physician to keep track of the various devices in the body. When the task of the nanorobots is completed, allowing them to exfuse themselves via the usual human excretory channels can retrieve them. They can also be removed by active scavenger systems. This feature is design-dependent

NANOROBOT WORKING IN BLOOD



VESSELS



CONCLUSION

Nanotechnology has become a reality and some companies are already implementing it. Nanotechnology is an expected future upcoming technology that will make most products lighter, stronger, cleaner, less expensive & more precise.

Nanotechnology is an enabler of accomplishment in a truly diverse mix of science and engineering field. Nanotechnology is going to be responsible for massive changes in the way we live, the way we interact with one another and our environment. NEMS are used for wide range of sensing application.

Nanomedicine is the application of nanotechnology and it has the potential to change medical science in twenty first century. This path breaking initiative needs a significant revolution in the existing medical technology to make this "through in mind into a thing in hand". Government funding in the field of nanotechnology is around 520 million dollars a year (according to the editors of Scientific American). Institutions like Foresight (foresight.org) and companies like Zyvex (zyvex.com) are further advancing nanotechnology. Although the future of medicine lies unclear, it is certain that nanotechnology will have a significant impact. The Philosopher's Stone can't be seen by the naked eye.

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