

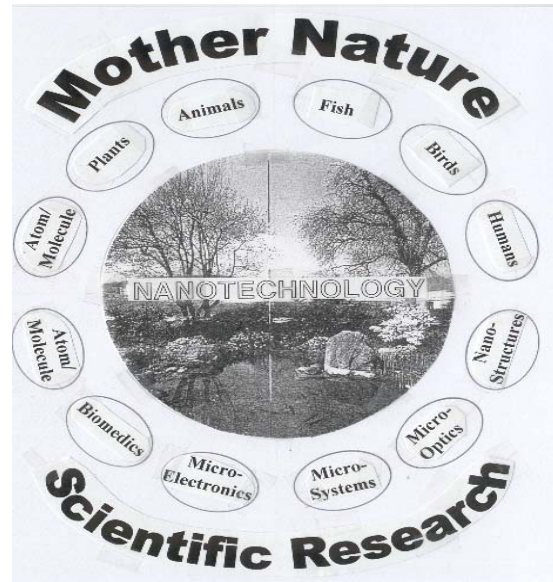
NANOTECHNOLOGY – Part A

(The Quiet Revolution Changing the World)

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There's a quiet revolution going on in the world called nanotechnology with some materials being developed that are beyond our comprehension today. How can anything so small that it cannot be seen by the naked eye be causing such a stir around the world? The world is on the brink of technological revolution capable of bringing wealth, health and education without pollution to all on earth.

The term nanotechnology applies to the study and manipulation of atoms or molecules, working with matter as small as 1/75,000 of a human hair. Mother nature got there first and gave us a good vision of what is possible; she has been creating all living things since the beginning of time starting with the right combination and placement of atoms and molecules. Nature is an example of the many possibilities of using a wide range of processes, procedures and sequences in a minimum of space. This scale is the Nanometer which *"size*



wise the atom is to the apple as the apple is to the globe of the world."

Household Developments

- A scientist wanting to make a super-slick surface copied lotus leaves that are waxy and covered with tiny nano-size bumps, so water rolls off. If this was applied to glass, windows would repel grime and never need washing.
- socks that do not pick up odors and get smelly and clothes that resist stains.
- toilets with surfaces so smooth that they clean themselves
- tennis balls that keep their bounce indefinitely.
- golf balls that correct their own flight path.
- E-textiles for clothes for the military, firefighters and police that are lightweight, fireproof, monitor body temperature, blood pressure, and heart rate.
- Molecular food synthesis ... end of famine and starvation

Communications

- Home information centres that will act as communication devices for all family needs such as shopping, medical checkups and health care, entertainment, travel, etc.
- Computers will be the size of a sugar cube that will be capable of processing one billion bytes per second, millions of times faster than the ones today.
- Circuit boards will be as small as a pinprick. Half a billion bytes of information can be stored on a computer chip no bigger than the thickness of a human hair.
- A transistor will be made up of a single molecule and one day there will be computer chips that can read everything that is on the Internet, in one second.
- Local and long distance Fiber networks.
- Small, powerful communications devices.

Environmental Concerns

- No more pollution and automatic cleanup of already existing pollution
- Pollution-free manufacturing with lower costs and improved quality.
- Terraforming on earth and in the solar system.

Medicine

Many disease-causing elements such as bacteria and viruses are nano size. So it only makes sense that nanotechnology would offer us ways of fighting back.

- Medical benefits - non-intrusive surgery, end to illness, slowing aging process
- Retinal implants for the blind to be able to see.
- Ear implants to restore hearing.
- Tissues and organs artificially grown.
- Nanostructured capsules to deliver drugs to specific cells in the body, e.g. cancer.
- Surgery will take place by injecting molecules and atoms to repair internal damage, rather than by cutting a patient open.
- Programmable controllable micro-scale robots will allow doctors to cure and repair parts of the human body at the molecular level.
- Medical Nanotechnology holds a promise of a virtual end to illness, aging, and death.
- Scientists are developing a lab-on-a-chip which is passed over patients to diagnose ailments and allow doctors to apply custom-made treatments and avoid the unnecessary side effects of something that will not work.

- The ancient Greeks used silver to promote healing and prevent infection, now scientists have revived and improved on the old cure by coating a burn-and-wound bandage with nano-size silver particles that are more reactive than the bulk form of the metal. They penetrate into the skin and work steadily to have bandages changed only once a week.
- Seventy percent of the chronic-wound patients [with diabetic foot ulcers] who were not healing at the expected rate were turned around with the use of these dressings.
- A cream that uses nanotechnology to treat eczema is undergoing clinical trials in Canada.
- The body recognizes an artificial titanium hip or knee as a foreign object and eventually may reject it. Now researchers have come up with a nanotube coating for titanium that is a very good mimic of collagen, a natural protein that is part of bone.
- As a result, the coating attracts bone cells called osteoblasts. This is important for bone growth by helping to attract the right cells to the right places, quickly.