Key Note Address

Nanotechnology and its Biotechnological Applications

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Nanotechnology is manufacture and use of materials and structures at the nanometre scale, as well as for design of new devices and processes. It involves the creation of useful/Functional materials, devices and systems (of any useful size) through control/manipulation of matter on the nanometer length scale and exploitation of novel phenomena and properties which arise because of the nanometer length scale. Nanoscale devices are a 100-10,000 times smaller than human cells and are similar in size to large biological molecules such as enzymes and receptors. Hence nanoscale systems possess bimolecular interaction on both the surface as well as the inside of cells allowing them the potential to detect diseases and deliver treatment to the body in an so far unknown way. It is said that because nano-components can be made to share some of the same properties as natural nanoscale structure, it is possible to develop artificial nanostructures that sense and repair damaged parts of our body, acting like naturally occurring biological nanostructures such as the white blood cells. Nano-biotechnology can offer many medical applications today ranging from cancer treatments by attacking directly the tumor, to treating diabetes by regulating and maintaining the body's own hormonal balance, to the restoration, maintenance and improvement of human organs and biocompatible implants.

In Nanotechnology, most of the promising applications are from Carbon Nanotubes (CNTs) which is a material of 21st century. This is currently attractive material for a diverse range of applications because of their extraordinary mechanical and electrical properties. These applications range from Medical to Nanoelectronics and Hydrogen storage. Their applications have already been demonstrated in controlled drug delivery/release, artificial muscles, polymer composites and sensors. CNTs offer a new double promise for medicine, providing better contrast agents for MRI and localized heaters that can induce a target cell death. They also offer a new approach to gene therapy, broken bone treatment, killing cancer cells and preserving healthy cells. Nanoparticles also play an important role in the treatment of Atherosclerosis. Here the Nanoparticles act as carriers to deliver the drug (Fumagilin) directly to the base of plaques. We have synthesized CNTs by using a LPCVD method at a temperature of 600°C. The Si substrate was pre-cleaned with acetone in an ultrasonic bath prior to the catalyst deposition. The Fe catalyst layer was then deposited on Si substrate by RF sputtering technique at a pressure of 10-6 Torr. After depositing the