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Nanotechnology and Its Applications

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ABSTRACT

Nanotechnology presents a wide range of problems and opportunities not just diverse issues, but different kinds of issues. These issues must be addressed by more than one kind of organization, based on more than one system of ethics. Guardian ethics, embodying force and caution, will be necessary to avoid the worst risks and dangers of nanotech. Commercial ethics, designed to maximize profit, will be most effective in funding development, solving problems, and building markets. Information ethics are well suited for situations that allow unlimited benefit from unlimited copying; the full potential of almost-free nanotech-based manufacturing cannot be achieved without them. This paper considers the foregoing points in detail, contrasting the three ethical systems and applying each system to an appropriate subset of the issues created by moderately advanced nanotechnology.

Keywords- Nanotechnology, Bucky paper, Nanorobotics

I. INTRODUCTION

Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers. Physicist Richard Feynman, the father of nanotechnology.

Richard P. Feynman

Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other science fields, such as chemistry, biology, physics, materials science, and engineering.

The ideas and concepts behind nanoscience and nanotechnology started with a talk entitled "There's Plenty of Room at the Bottom" by physicist Richard Feynman at an American Physical Society meeting at the California Institute of Technology (CalTech) on December 29, 1959, long before the term nanotechnology was used. In his talk, Feynman described a process in which scientists would be able to manipulate and control individual atoms and molecules. Over a decade later, in his explorations of ultra-precision machining, Professor Norio Taniguchi

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coined the term nanotechnology. It's hard to imagine just how small nanotechnology is. One nanometre is a billionth of a meter, or 10^-9 of a meter.

For example;

A sheet of newspaper is about 100,000 nm thick. If a marble were a nanometre, then one meter would be the size of the Earth Nanoscience and nanotechnology involve the ability to see and to control individual atoms and

molecules. Everything on Earth is made up of atoms—the food we eat, the clothes we wear, the buildings and houses we live in, and our own bodies.

But something as small as an atom is impossible to see with the naked eye. In fact, it's impossible to see with the microscopes typically used in a high school science classes. The microscopes needed to see things at the nanoscale were invented relatively recently—about 30 years ago.

Once scientists had the right tools, such as the scanning tunneling microscope (STM) and the atomic force microscope (AFM), the age of nanotechnology was born.[1]

Few interesting topics in which nanotechnolgy plays a major role are/ applications of nanotechnology:

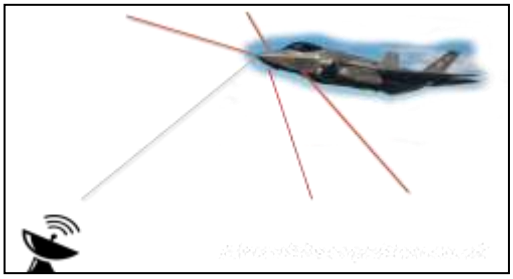
A. NANOROBOTICS

Nanorobotics is an emerging technology field creating machines or robots whose components are at or near the scale of a nanometre (10−9 meters). More specifically, nanorobotics (as opposed to microrobotics) refers to the nanotechnology engineering discipline of designing and building nanorobots, with devices ranging in size from 0.1–10 micrometres and constructed of nanoscale or molecular components [2].

The terms nanobot, nanoid, nanite, nanomachine, or nanomite have also been used to describe such devices currently under research and development. Another definition is a robot that allows precise interactions with nanoscale objects, or can manipulate with nanoscale resolution. In the same ways that technology research and development drove the space race and nuclear arms race, a race for nanorobots is occurring. There is plenty of ground allowing nanorobots to be included among the emerging technologies.

Nanobots will be the next generation of nanomachines. Advanced nanobots will be able to sense and adapt to environmental stimuli such as heat, light, sounds, surface textures, and chemicals; perform complex calculations; move, communicate, and work together; conduct molecular assembly; and, to some extent, repair or even replicate themselves.[3][4]

Nanobot.info is an informational site that provides information on both recent developments and future applications at the intersection of nanotechnology and robotics. Nanotechnology is the science and application of creating objects on a level smaller than 100 nanometers.



B. Nano Enabled Coating Makes Aircraft Invisible

INTRODUCTION

The nanocoating achieves its radar trickery by absorbing the radio waves emitted by the radar and scattering them as heat energy enough so that when the radar gets the bounced back signal it is not regular enough to indicate an object.

Nanomaterial use in construction, in coatings, in site remediation, and on invisible planes Construction:

Certain nanomaterials can improve the strength of concrete, serve as self-cleaning and self-sanitizing coatings. Titanium dioxide is used to coat these paving slabs (TiO_2). Titanium dioxide is a photo catalyst; it uses sunlight to accelerate a naturally occurring. An Israeli company has developed a paint for airplanes that can make them invisible to radar.[5]

C. Buckypaper

INTRODUCTION

Buckypaper is a thin sheet made from an aggregate of carbon nanotubes or carbon nanotube grid paper. The nanotubes are approximately 50,000 times thinner than a human hair. Originally, it was fabricated as a way to

handle carbon nanotubes, but it is also being studied and developed into applications by several research groups, showing promise as vehicle armor, personal armor, and next-generation electronics and displays.

Buckypaper is one tenth the weight yet potentially 500 times stronger than steel when its sheets are stacked to form a composite.[6] It could disperse heat like brass or steel and it could conduct electricity like copper or silicon.

II.APPLICATIONS

Fire protection: covering material with a thin layer of buckypaper significantly improves its fire resistance due to the efficient reflection of heat by the dense, compact layer of carbon nanotubes or carbon fibers.[7] If exposed to an electric charge, buckypaper could be used to illuminate computer and television screens. It could be more energy-efficient, lighter, and could allow for a more uniform level of brightness than current cathode ray tube (CRT) and liquid crystal display (LCD) technology.

Buckypaper could act as a filter membrane to trap microparticles in air or fluid. Because the nanotubes in buckypaper are insoluble and can be functionalized with a variety of functional groups, they can selectively remove compounds or can act as a sensor.

III.CONCLUSION

After an exciting journey into the world of nanoscience and technology we have gained a better realization of the various strategies in which nanotechnology and nanomedicine can work to develop the quality of the human life. Although in the upcoming days it is highly difficult to predict the significance of nanomedicine in our life with so many uncertainties and uncontrollable factors but nanomedicine have the huge potential to multiply the power of medicine and also to bring revolution in our everyday lives.[8]

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