GREEN NANOTECHNOLOGY: NEW PATHWAY IN SCIENCE

Introduction

Nanotechnology is related to the study of size of the matter on the basis of atom or the molecular scales.it is related to the size between the 1-100 nanometers in at least one dimension it involves various changes in the size of the material. Nanomaterial has various properties such as they are more durable, lighter, they are very strong, they show very good properties. Nanotechnology necessitates the capability to edge works of molecular size and specific machine.so we say that the nanotechnology is the simple ability to construct the various things from bottom up techniques. This nanotechnology was first explain by the scientist namely R. Feynman with their different applications. The national science foundation can give the nanotechnology as the is understanding of the molecules as the individual atoms and molecules. mIn the global competition the Science, Engineering and technology play important role. Mostly the modern science have one of the innovative feature from the nature as the form of nanoscale ,which is good integration of the technology.

Now days the nanotechnology was referred as the one of the tool for the development of the all area of the society and the most of the industries. Mostly the convergence and the divergence in the longitudinal development in the area of the science and engineering.from the 18 thy and 19th century there is large development in the science mostly it lead to the narrow disciplinary specialization. The convergence at the nanoscale reached in the science in the year of 2000 and it lead to the new development in the science in these decades.

There is the constant development in filed of the nanotechnology as the Christopher Palmberg ,Tuomo Nikulainen Industrial Renewal and Growth through Nanotechnology ? - An Overview with Focus on Finland January 2006

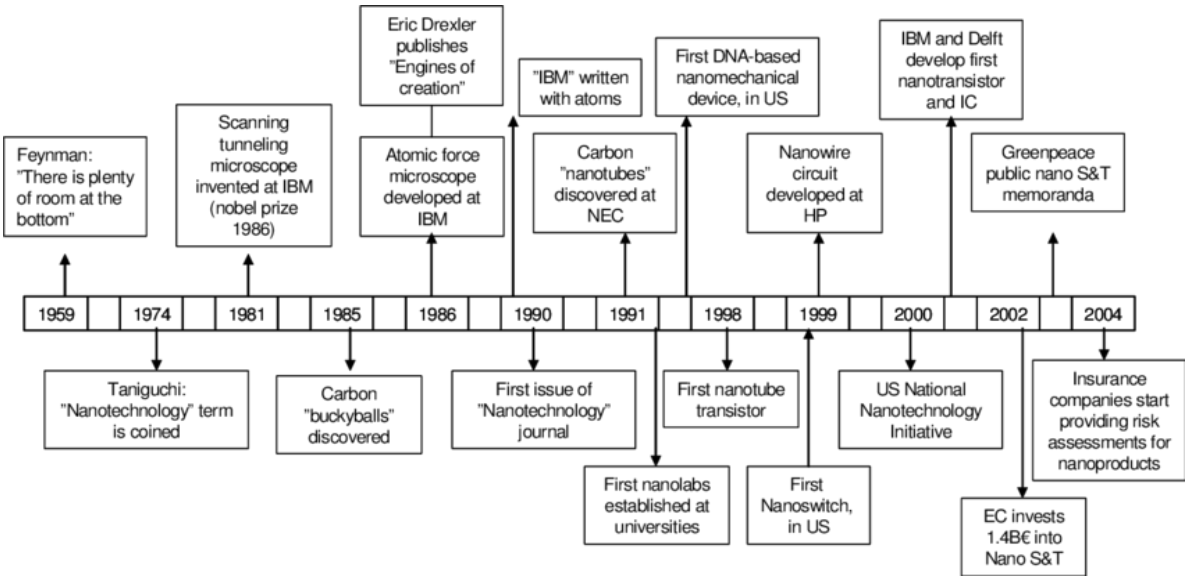

Fig.1 Development of the nanotechnology

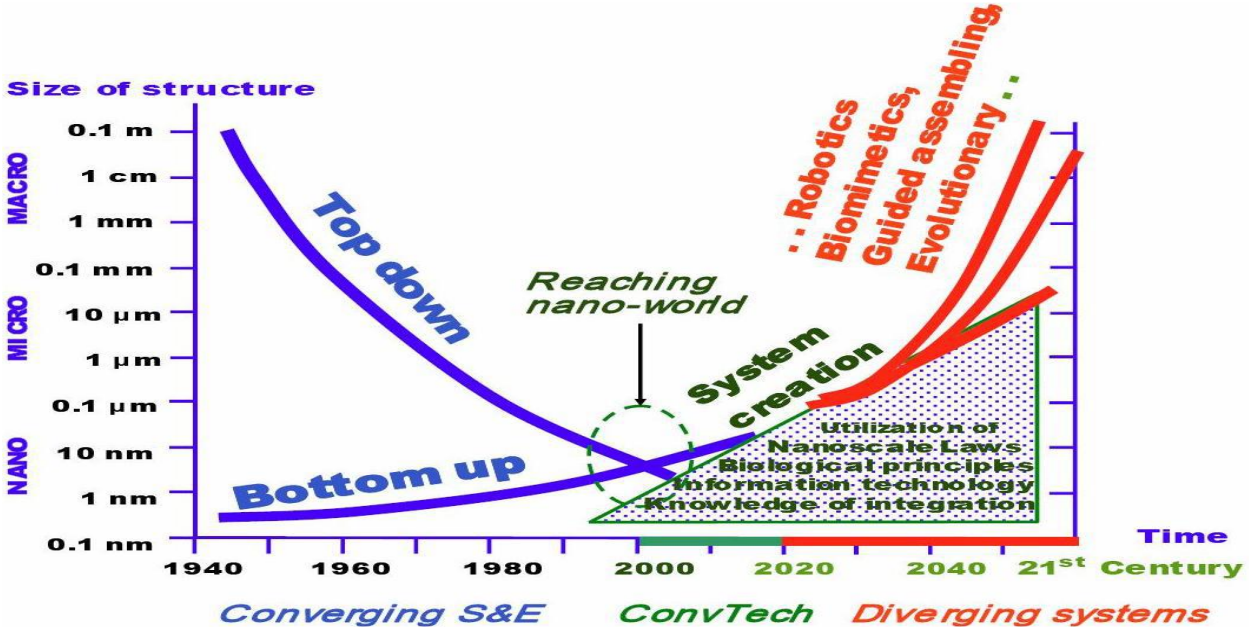

Figure 2. Reaching at the nanoworld (about 2000) and "converging technologies" approach for system creation from the nanoscale (2000-2020) towards new paradigms for nanosystem architectures in applications (after 2020).

Branches of the Nanotechnology

A very large development taking place in the colleges and universities for the development of the various industrially and house hold useful products. There are many branches of the nanotechnology which are in the field of the global market as the agricultural, non-fuel commodities, mineral. Nanotechnology is considered as innovative castigation in footings of its effect on industrial applications. The field of the nanotechnology gives the answers to various problems of industry or household problems. Depending on the strong inner panel of the nanotechnology there are several fields which are described in the figure 3.

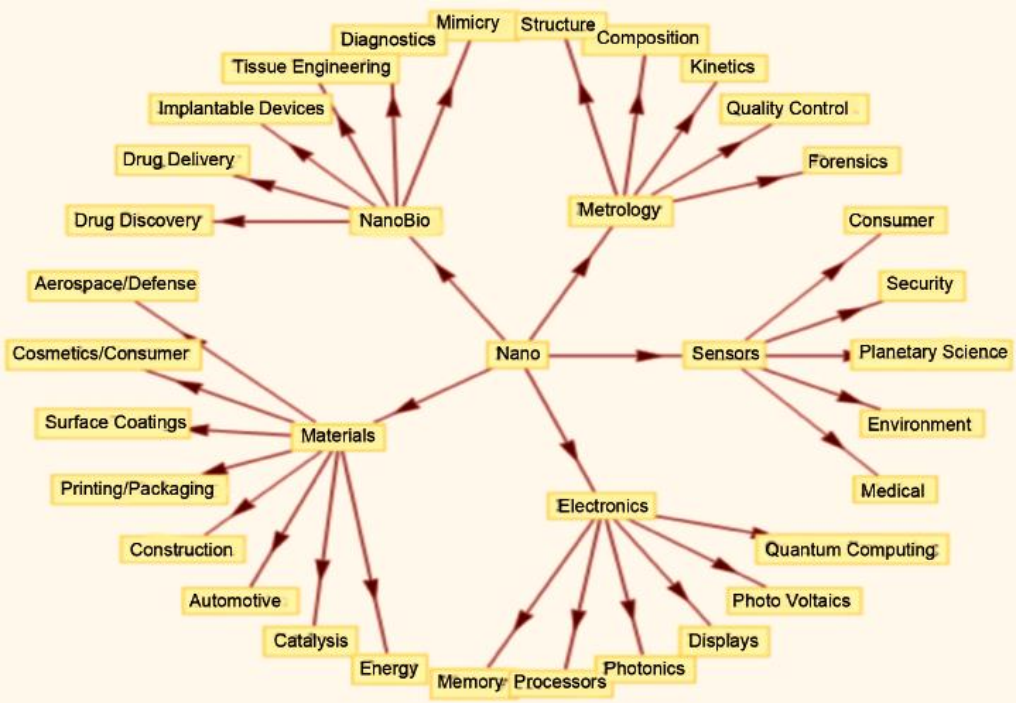

Fig. (3) M. Amin Bhat Nanotechnology, Metal Nanoparticles, and Biomedical Applications of Nanotechnology July 2014

1.Nano engineering

This Nano engineering is very important branch of the nanotechnology of the practice of the nanoscale. The term Nano engineering derived from the nanometer in which a unit equaling to the billionth of the meter, the branch is of the engineering rather than the applied science .the most common techniques scanning tunneling microscope and other molecular assembly techniques in the nanotechnology ,these can be used to study single atom ,these can be used to study the many biological structures

Mostly the scanning and tunneling microscope with molecular self assembly are most important techniques in the nanotechnology used for the

Scanning tunneling microscope (STM) and molecular self- assembly are two techniques of Nano engineering.STM is used to employ structures as small as a single atom whereas with Molecular self-assembly, an arbitrary sequence of DNA can synthesized and used to create custom proteins or regular patterns of amino acids [5].

2. Green Nanotechnology

Green nanotechnology is the branch of nanotechnology that enhances the environmental sustainability of processes producing negative facet. It includes manufacturing green Nano-products and then using these Nano-products in support of sustainability [6]. The goal of green nanotechnology is to minimize future environmental and human health risks associated with the use of nanotechnology products, and to boost the replacement of existing products with nano-

products that are more environmentally friendly. Solar cells [7], Nano remediation and water treatment all applications are based on green nanotechnology [8].

3. Wet Nanotechnology

Wet nanotechnology refers to working up with large masses from small ones [9]. W. Eric Drexler put forth the idea of Nano-assemblers working dry. The wet nanotechnology comes out to be the first area in which a Nano-assembler attains the trading results. Pharmaceuticals and bioscience are main features of wet nanotechnology [10]. R.A.L. Jones puts the bits of natural nanotechnology into a synthetic structure biokleptic nanotechnology. Using the guiding principles of biomimetic nanotechnology, trillions of nanotech robots are designed that resemble bacteria in structural properties, entering a person's blood stream to do medical treatments like cancer [11].

Uses of Nanotechnology

From the past two decades, scientists and engineers have mastered the complexities of working with nonmaterial and research is still going on. Nowadays most of the products are manufactured by nanoscale materials. Sunscreens containing nanoscale zinc Oxide or titanium dioxide that reflects ultraviolet light to avert sunburns. A nanoscale dry powder can neutralize gas. So, the nanoscale materials are being used to manufacture the batteries for tools in order to deliver more power, more promptly and dissipating less heat. The dressing of anti bacterial wound use nanoscale silver [11]. Other uses of nanotechnology includes sports equipment, vehicle parts, storage of power in batteries, moisturizing effectiveness of cosmetics, drug delivery and other numerous techniques and products based on nanoscale material are described in brusque.

1. Carbon Nano Tubes (CNT)

Carbon nanotubes are allotropes of carbon having a cylindrical nanostructure. Nanotubes have been constructed with length-to-diameter ratio of up to 2, 80, 00,000:1 that is much larger than any other material. These cylindrical carbon molecules possess extraordinary strength and unique electrical properties. These novel properties make them substantially useful in various applications in electronics, nanotechnology, optics, materials science, as well as in architectural fields. Their final usage, however, may be limited by their potential toxicity [11]. Nano tubes are shown in figure 2.

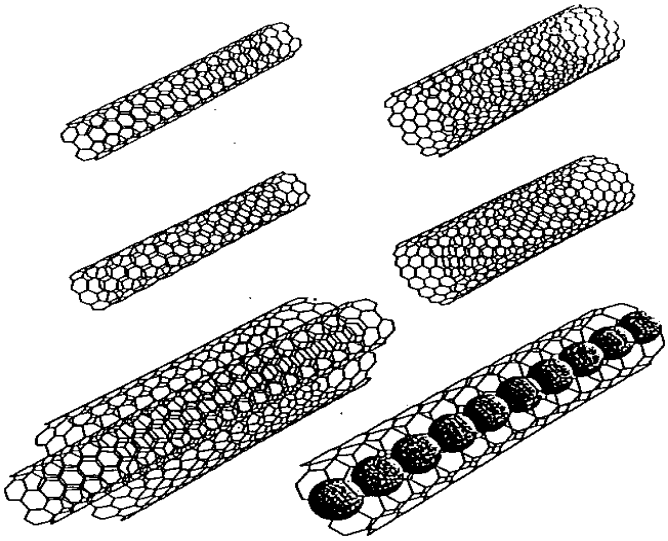

Fig.4. Carbon Nano Tubes (CNT) [Source 11]

2. Thin Nano Films

Various nanoscale materials can be used in thin films to make them water repellent, UV or IR-resistant, anti reflective, anti-microbial , self-cleaning, anti-fog, Scratch resistant or electrically conductive. Applications of Nano films include computer display, cameras and eyeglasses [11]. Nano film is shown in figure 3.

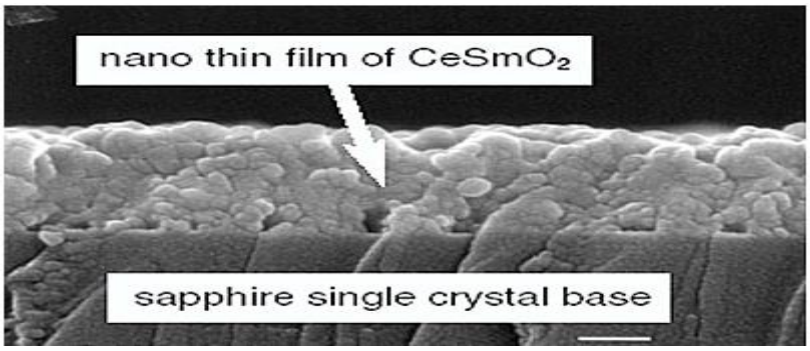

Fig.5. Thin Nano film [source 11]

3. Nano scale Transistors

A transistor is a semiconductor electronic device used to amplify or switch electronic signals and electrical power. In transistors, a small amount of electricity is used as a gate to control the flow of larger amount of electricity. More the number of transistors are embedded in the computer, the greater will be power. Transistors sizes have been decreasing day by day, so

computer have become more powerful. Upto now, the industry's best trading technology produced computer chips with transistors having 45-nanometer features. Recent announcements indicate that even more small size of transistors is possible with the help of nanotechnology [11]. Nano scale transistors are shown in figure 4.

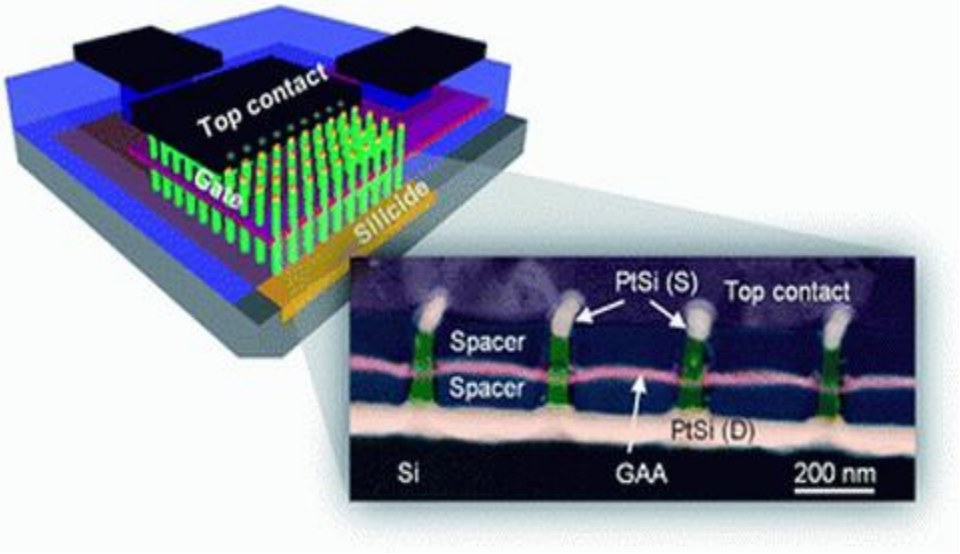

Fig.6 Nano scale Transistors [Source 12]

4. Drug-Delivery Technique using Dendrimers

Dendrimers are highly branched, star-shaped macromolecules with nanometer-scale dimensions shown in figure 5. Dendrimers are specially designed and manufactured for a vast variety of applications, including the treatment of cancer, drug delivery, catalysis, gene transfixion, and energy harvesting and photo activity. Dendrimers carrying different materials and their branches can do several things at one time, such as perceiving diseased cells, diagnosing diseased states (including cell death), drug delivery, describing location and reporting events of therapy [11].

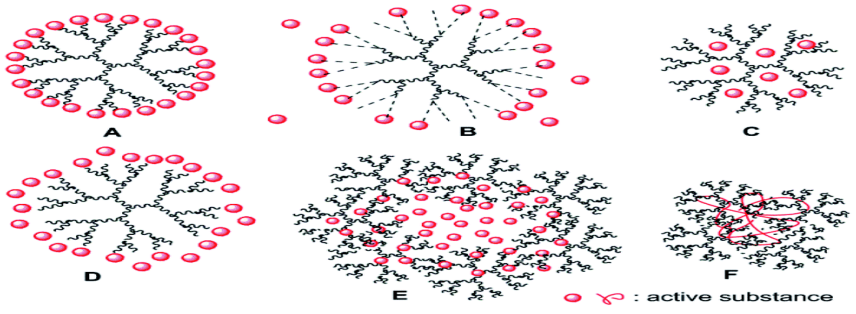

Fig.7. Drug delivery using dendrimers [Source 11]

5. Water Filtration technique

Carbon nanotubes based membranes are used for water desalination and nanoscale sensors to diagnose contaminants in water system. The process of water filtration using carbon nanotubes is shown in figure 6.Nanoscale titanium dioxide is the other nanoscale material that has great potential to filter and purify water system and it is also used in sunscreen to neutralize bacteria [11].

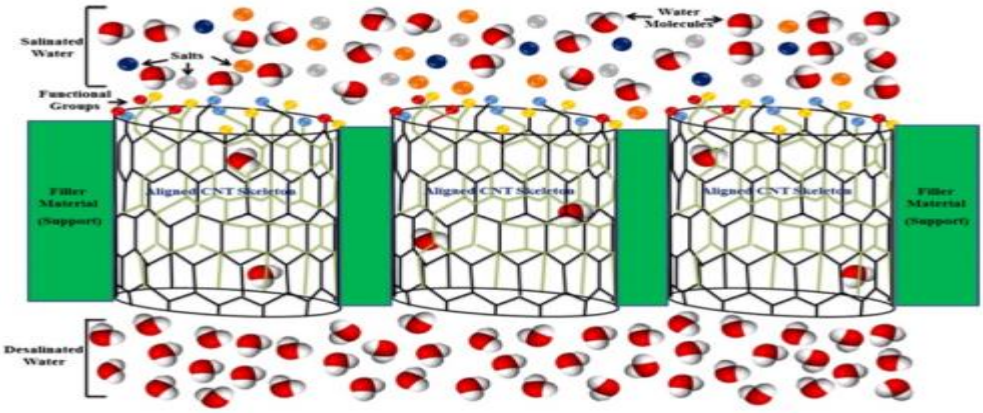

Fig.6. Water filtration technique [Source 8]

Conclusion

Nanotechnology is the science of tiny particles. The nanotechnology envisions a world in which new products are designed at the atomic and molecular level; provide realistic, cost-effective methods for strapping renewable energy sources and keeping the environment clean. Nowadays, many of scientists and engineers are finding new ways to use nanotechnology to improve the world. There are numerous applications of nanotechnology including electronics, biology, chemical engineering and robotics electronics. By the help of nanotechnology, doctors detecting disease at its earliest stages and treating illness such as heart disease, cancer and diabetes with more effective and safer medicines. Researchers also picture new technologies for protecting both the civilians and military forces from conventional and chemical weapons. Although there are many research challenges ahead, nanotechnology already is producing a vast range of favorable materials and pointing to development in many fields. It has opened scientific Inquiry to the level of nanoparticles and gives a world of new opportunities.

References

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