

Nanotechnology

Introduction

The word nanotechnology got invented in 1974 by the Japanese Norio Taniguchi. Nano comes from the Greek and means dwarf. Nanotechnology deals with a magnitude of $1/1\,000\,000$ mm. The major research objectives in molecular nanotechnology are the design, modelling, and fabrication of molecular machines and molecular devices.

There are two ways in the research of transferring nanosystems. Which are produced in the following segment:

- On one hand one tries to understand causes and happenings in nature. By copying nature and with this knowledge he tries to apply these things to new material.
- On the other hand in the inanimate world by creating continuously smaller and smaller structures and basic elements for new material one took the way to the nanometer dimension. In this manner the new discovered invention were used for example in the electronic, opt electronic and sensoric.

Examples for the use of the nanotechnology in the computer technique

In nowadays the silicon chips can be reduced to the size of 40–50 nanometer. If the velocity stays the same by the year 2012. Beyond this size its impossible concerning this element. Because of a quantum mechanic effect. The electrons are able to pass the partition and will cause a short circuit. An alternative could be nano chips based on carbon bonds. First molecular electrical elements are already created. A transistor made out of tiny carbon pipes with the diameter of one nanometer. Physicians from the Netherlands were able to use these for creating a metal semiconductor contact for a transistor. These “Nano Tubes “ which were discovered in 1991 in a Japanese labour, can be both. By cracking these it creates a metal and a semiconductor half.

There are also some experiments with Fullerenen. The carbon molecules with a sphere shape which were discovered in 1985. The C60 looks like a soccer ball because the C-atoms are connected in 5 and 6 angles . A US- Team were able to fix this ball between two gold electrodes. These creation was a one molecule transistor. Today they have discovered other molecules that can work as rectifier, data logger or as conductor. For saving one bit you need theoretically only molecule. If you create a hard disk with this system you have a data logger density which is much higher then normal hard disks today.

A mechanical nano saving technique were invented by the IBM research workers lead by g. Binning. Their “Millipede consists of raster with 1024 tackle arms belonging to a power microscope. Their pike punches into a soft polymer surface a hole by writing a bit. For reading the Millipede senses a already punched surface. Bye falling into a hole the temperature changes and therefore the electrical resistance, which is measurable. With this technique you can get 80 gigabit per sq cm. In compare a hard disk today has a save density of 8 GB per 2 sq cm.

Use in other areas

By creating molecular structures in nanometer magnitude, opens a new variety of material. Under room temperature a gold nugget are normally not useful as catalyst for chemical reaction. But 3-4 nanometer big gold particles can work as one. A Japanese company has use these effect by creating a "Odor Eater" which divides the molecules form the toilet smell with the help from the nano gold nugget.

The nanotechnology makes it possible to transfer surface structures from nature. Which makes it possible to create surfaces that stay clean "Lotus Effect" (property from the lotus flower).

Nanotechniques catalyst can avoid to waste resources. After Markus Antonietti from Max-Plank-Institute for Colloid and Interface research in Golm over 20% from the crude stay unused because the cracker in the industry don't work efficiency enough.

He and other research worker work at a new ceramic cylinders, which are covered with nanometer big holes and can only get one molecule. By using these cylinders it is impossible that a molecule chain brakes like it does in the big containers.

Certainly the nano equipment is useless without the computer. This marks a new time area in the history of the technique. Over thousands of decades one could feel the effect directly of the tool. Or at least one were able to see directly the work as one sees at a Steam engine . However the viscera from the cosmos – atoms and molecules- are with none of our senses visible. Everything which happens in this sphere we have to let us translate with pictures and models by a computer. The encoding from the human genomes where superior a computer work . When you have to create in the tiny world with tools you can also simulate it with these equipment. This could be a new step in the history of the technique. It might be a solution to avoid negative causes and mistakes.

Problems

Besides the advantages the nanotechnology brings of course there are some disadvantages too. One danger arises by building micro robots which are suppose to destroy cancer. When these robots get the property to reproduce and we lose the controle. They can destroy all life on earth. These negative illusion is called the" gray goo problem".

Conclusion

The nanotechnology is still in its baby shoes. It has a big potential. But now we are only possible to use a small fragment from it. However it has taken a big part in the information technology and in other areas too. For example biology, medicine, physics etc.