NANOTECHNOLOGIES

AND THEIR WORLD

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#1. WHAT ARE NANOTECHNOLOGIES?

Nanotechnologies are a development of scientific research. They are intended to understand and manipulate the properties of matter in the nanometer scale (one billionth of a meter). In practice it is the study and application of very small materials, usable in various scientific fields: from chemistry to biology.

#2. WHY MANUFACTURE «NANO» TECHNOLOGIES.

1. New types of materials can be manufactured that use the nanostructuring of animals and plants, giving them particular characteristics.
2. Nanotechnologies offer new properties and therefore new products.
3. Nanotechnologies are also used in the medical field and therefore go to improve the quality of life.
4. Manufacturing nanotechnologies involves less waste of materials and energy.
5. Manufacturing nanotechnologies allows a lower environmental impact and easier recycling.

#3. MEDICINE AND TECHNOLOGIES

- Applying the technological nano to medicine we have what is called "nano-medicine". One of the applications developed by nanomedicine is the use of nanoparticles capable of conveying drugs. Other researchers have also developed nanoparticles that can recognize when the level of glucose in the blood increases and automatically activate when they release insulin. Nano-medicine can also be used in the diagnosis of diseases. Indeed, a group of researchers developed nanoparticles capable of binding to cancer cells and releasing biomarkers. What we intend to realize are nanoparticles capable of carrying numerous biomarkers, when these are then released they generate a high concentration that allows us to identify and localize the disease.

#4. MEDICINE AND NANOTECHNOLOGIES.

- The concept of nanoscience was first formulated by the physicist R. Feynman in 1959 who hypothesized the construction of devices of various nature by acting directly on the position of the atoms in the matter. The term nanotechnology appeared in 1974 in the article by N. Taniguchi which demonstrated the feasibility of nanotechnology.

#5. NANOMATERIALS.

- Nanotechnologies have led to the development of nanomaterials that have structural components with at least a dimension of less than 100 nm. The term nanomaterials identifies a natural material, derived or manufactured, containing particles in the free, aggregated or agglomerated state and in which, for at least 50% of the particles present, one or more external dimensions are between 1 and 100 nm.

#5. NANOMATERIALS.

- Nanomaterials can be classified according to size as: 1) zero-dimensional (0D) ⇒ three dimensions in nanoscale. 2) one-dimensional (1D) ⇒ two dimensions in nanometer scale. 3) Bi-dimensional (2D) ⇒ a dimension in nanoscale. 4) three-dimensional (3D) ⇒ no dimension in nanoscale.

#6. NANOTECHNOLOGIES ECOLOGICAL APPROACH.

- This new awareness has led to the development of an ecological approach for the synthesis of nanotechnologies that has various advantages such as simplicity, cost-effectiveness, compatibility for biomedical and pharmaceutical applications, as well as for large-scale commercial production. The synthesis and assembly of nano technologies would benefit from the development of "clean", non-toxic and environmentally friendly technologies. This provides for "the use of a series of principles aimed at reducing or eliminating the use of substances that generate hazardous waste in the design, production and application of chemical products". Thus allowing to obtain high precision in the synthesis and considerable reduction of waste, enormous benefits in production on a commercial scale, for society and the environment.

#7. APPLICATION OF NANOTECHNOLOGIES

- Nanotechnologies find application in all productive sectors: 1) Biology: nanosensors and manipulators of biological matter. 2) medicine: markers, detectors, drug distributors, used for the diagnosis, therapy, treatment of many diseases and tumors.

Many products related to the use of nanotechnologies are already available on the market or in the process of being and their number is constantly growing. Among them we can mention, for example, nanoparticles for cosmetics, paints, fabrics that do not wrinkle and do not release odors, sports items but also nanocomposites, "hard disks" with nanostructured surfaces for very high density data recording, memory "chips" with dimensions smaller than 100 nm, photonic devices, self-cleaning surfaces, medical diagnostic systems based, for example, on the "lab-on-chip" principle

FROM:

Lorenzo Salerno, Romani Chorgoliani,

Davyd Dzhelema, Marian Cebotaru

Thank you!