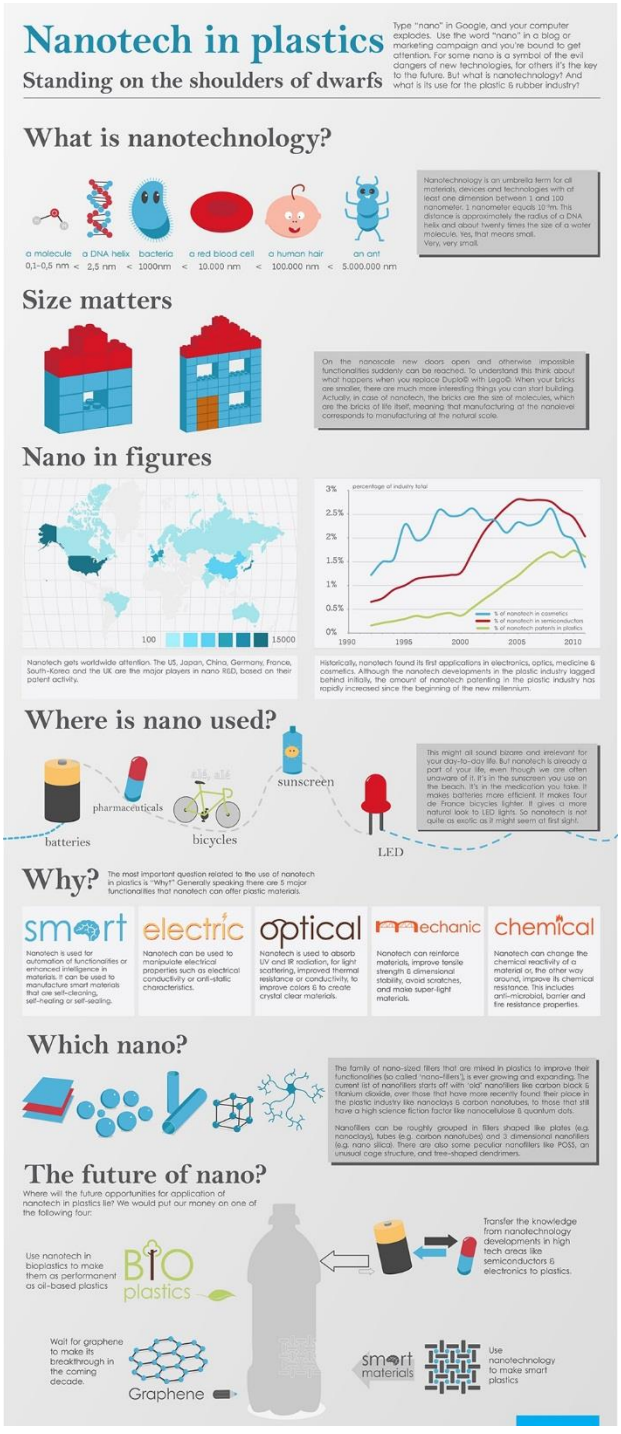
RASTGAR
AIR COMRPESSORS

Imtiaz Rastgar

The Future of Plastics and Nanotechnology

Nanotechnology is an exciting technological advancement that has the potential to contribute significantly to the future of plastic. Through nanotechnology, special Nano composites can be created that will be more dent, heat, and scratch resistant. Yet, the thermoplastic resins used to create the plastic can still be processed with the same equipment currently used to process resins.



A Closer Look at Nanotechnology

Nanotechnology involves being able to understand and to control matter at the amazingly small dimensions of one to 100 nanometers, with one nanometer being equivalent to one-billionth of a meter. As a point of reference, a sheet of paper is about 100,000 nanometers thick. With nanotechnology, an object can be imaged, measured, modeled, and manipulated right down to each nanometer. At this very tiny level,

the chemical, physical, and biological properties of materials are different than when in their bulk form. These new properties, therefore, can be used in different ways.

The plastics industry uses nanotechnology in a variety of ways. Materials reinforced through nanotechnology are used in thermoplastics because they are capable of resisting heat, provide dimensional stability and are capable of conducting electricity. Plastic nanotubes also are being created with nanotechnology. These nanotubes are flexible, lightweight and durable, and are being used in the automotive, aerospace and chemical industries. Finally, special nanocomposite foams have been created and are expected to replace solid plastic because they are much lighter.

Opportunities for Pakistan's Plastics Sector: Enterprising Companies can now team up with University Researchers and utilise the Higher Education Commission's grant from the National Technology Development Fund to develop salable products based on Nano Tech. The NTDF is a Rs.2.94 Billion amount from which each applicant can avail a grant of Rs. 14.00 Mil. http://hec.gov.pk/english/services/students/TDF/Pages/Intro.aspx

Nanotechnology Concerns

Since nanotechnology is a relatively new concept, there are still concerns associated with it. For example, critics of the nanotechnology maintain that certain substances may become toxic when manipulated at this small scale. Further, critics fear some of these manipulated substances could cause harm to the immune system if inhaled, absorbed through the skin, or otherwise digested.

Concerns involve predictability, the impact on the health of employees and consumers and the impact on the environment. Predictability is an issue because no one really knows how these nano materials will behave over time. The behavior of materials at the nanoscale is not the same as those observed at larger scales. George Kimbrell from the International Center for Technology Assessment explained the "scientific consensus on nanomaterials is that nano does not mean merely tiny, but rather materials that have the capacity to act in fundamentally different ways."

Of special concern is the health of employees involved in manufacturing products incorporating nanomaterials. For the manufacturing employees who will have the most extensive exposure to nanomaterials, there is a real health risk in handling such

small materials. Due to their extremely small size, nanomaterials have the ability to move throughout the environment unnoticed. Inhaled nanomaterials can flow through the body undeterred by the human body's natural defenses that would usually serve to block larger particles.

There is simply no way of knowing how each and every nanomaterial will behave once inside the body or what long-term effects it may have. Many have equated the potential risk of nanomaterials to human health to those created by asbestos. The study of the potential health risks of nanomaterials has its own name – nanotoxicology.

Nanospider™ Electrospinning Technology by Elmarco

Uses for Nanotechnology

Through the use of nanotechnology, the plastics industry hopes to achieve several amazing new accomplishments. For example, it may be possible to create auto body paints that are completely scratch-resistant. Or, many materials and products currently in use can be reduced further in size while improving efficiency. Memory chips the size of a postage stamp, yet capable of holding the data equivalent to 25 DVD's, is also on the horizon through the use of nanotechnology. Similarly, solar panels that can be manufactured at a much lower cost then they currently are may be able to be produced with nanotechnology.

Currently, nanotechnology is used in the creation of numerous materials.

Industrial Nanofiber Production with Elmarco

Elmarco Nanospider™ equipment (NS equipment) is designed for the production of all sorts of organic and inorganic nanofibers. The product range goes from nanofiber equipment for laboratories to enable the development process, over production lines for low to moderate production volumes, to industrial scale high volume production.

Materials reinforced through nanotechnology are used in thermoplastics, as they are capable of resisting heat, are flame retardant, provide dimensional stability, and are capable of conducting electricity. These nanocomposites are used in such places as the body side molding of vehicles, automotive parties, and fuel-line components. They are also used with hard drives in order to make them more conductive.

Plastic nanotubes are also being created with nanotechnology. These nanocomposites are generally 50 to 150 nanometers in diameter and are used to conduct electricity. While these nanotubes have the current carrying capacity of copper, they are extremely flexible. They are also very lightweight and durable. This technology is expected to be able to lead to the creation of conductive paints, caulks, coatings, sealants, fibers, and adhesives. The thick sheets and tubes are also considered to be potentially valuable to the automotive, aerospace, and chemical industries.

Finally, special nanocomposite foams have already been created. Over time, these foams will likely replace solid plastic because they are much lighter, yet look the same as solid plastics. Potential uses for these foam nanocomposites include coffee cups, fast food containers, home insulation, carpet padding, disposable diapers, seat cushions, and packaging material.

Rastgar & Co is authorized representative of Elmarco , Nano fiber equipment in Pakistan http://rastgar-co.com/elmarco-nano-for-life-ns-lab/