

Editor's Point – Biotechnology and NANO-Particles

Engineering has impact on every sphere of human life. It is expected to improve “Quality of Life” but then there are adverse effects as well. At times one wonders why a person with simple living and no addiction of tobacco etc gets diagnosed with CANCER. There are reasons that need to be understood. The disciplines of BIOTECHNOLOGY and NANO-Particles have added new dimension to Technology and Life Sciences.

- Nanotechnology is believed by some to be the ‘next industrial revolution’, but like genetically modified foods, it has never been proven totally safe for use or consumption.
- Genetically modified foods have already been shown to cause numerous health and environmental complications, but still they continue to be pushed.
- To mark **World Environment Day (WED) - June 5**, we provide a glimpse of Nanotechnology.

World Environment Day (WED) is the United Nations' principal vehicle for encouraging worldwide awareness and action for the environment. It is widely celebrated by stakeholders in over 100 countries. It also serves as the ‘people’s day’ for doing something positive for the environment, galvanizing individual actions into a collective power that generates an exponential positive impact on the planet.

Hope, you had opportunity to read our earlier issues of April and May 2014. If not, read them at our website <http://ibf.org.in> and suggest to your near and dear ones to support our mission

What is NANOTECHNOLOGY?

Have you ever thought, what causes a falling stream of fluid to break into droplets? Shabahang and fellow graduate student Joshua Kaufman at the University of Central Florida (UCF) were working on a project that involved heating and stretching glass fiber on a homemade tapering machine to make the center of the cable thinner. The process is known as THERMAL DRAWING. But, instead of stretching, the material broke apart into multiple miniature spheres. The students thought it to be a failed experiment; but it led to a discovery hailed by some scientists as a potential game changer for the mass production of NANOPARTICLES. (<http://today.ucf.edu/ucf-nanoparticle-discovery-.../>)

NANOTECHNOLOGY is the manipulation of particles that are millionths of a millimetre in size. A single human hair is around 80,000 nanometres in width. At this scale, the electrical, physical and chemical properties of a material can change dramatically. Some forecasters say nanotechnology could bring us tremendous benefits. Others claim it could run amok and devastate our world.

Nanoparticulate DRUG DELIVERY SYSTEMS offer many advantages over conventional dosage forms. These are improved efficacy, reduced toxicity, enhanced biodistribution and improved patient compliance. The nanoparticles include nano-emulsions, dendrimers, nano-gold, liposomes, drug-carrier conjugates, antibody-drug complexes, and magnetic nanoparticles. These are primarily based on unique assemblies of synthetic, natural, or biological components, including but not limited to synthetic polymers, metal ions, oils, and lipids as their building blocks.

The tissue studies indicate that nanoparticles, engineered materials about a billionth of a meter in size, could damage DNA and lead to cancer, according to research presented at the 2007 Annual Meeting of the American Association for Cancer Research. <http://phys.org/news96041735.html#jCp> On the positive side, use of biodegradable polymeric nanoparticles (NPs) for controlled drug delivery has shown significant therapeutic potential. Concurrently, targeted delivery technologies are becoming increasingly important as a scientific area of investigation. In cancer, the targeted polymeric NPs can be used to deliver chemotherapies to tumor cells with greater efficacy and reduced cytotoxicity on peripheral healthy tissues.

INTERESTING LINKS:

Reference	KNOWLEDGE sites for Engineering Students and Professionals
www.wef.org	Innovative Sewer Grit Treatment with Process Water Recycling. In many Cities road sweepings or Vactor truck contents are often collected and dumped in abandoned lagoons or to landfills sites. Huber has developed the RoSF5 Grit treatment System .
Business Standard	India can emerge as a manufacturing hub for HVAC industry: http://www.business-standard.com/content/b2b-chemicals/india-can-emerge-as-a-manufacturing-hub-for-hvac-industry-ravichandran-purushothaman-danfoss-114051900945_1.html?src=email

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<http://www.envirotechinstruments.in/>

Email: enviotech@vsnl.com / sales@enviotechindia.com

Nanoparticles in Food and Vitamins Could be Harmful

Billions of engineered nanoparticles in foods and pharmaceuticals are ingested by humans daily, and new Cornell research warns they may be more harmful to health than previously thought. A research collaboration led by Michael Shuler, a professor of Chemical Engineering and chair of Biomedical Engineering at Cornell University, studied how large doses of polystyrene nanoparticles – a common, FDA-approved substance found in substances ranging from food additives to vitamins – affected how well chickens absorbed iron, an essential nutrient, into their cells. The results were reported online Feb. 12 in the journal *Nature Nanotechnology*.

According to the study, high-intensity, short-term exposure to the particles initially blocked iron absorption, whereas longer-term exposure caused intestinal cell structures to change, allowing for a compensating uptick in iron absorption. The researchers tested both acute and chronic nanoparticles exposure using human gut cells in petri dishes as well as live chickens and reported matching results. They chose chickens because these animals absorb iron into their bodies similarly to humans, and they are similarly sensitive to micronutrient deficiencies.

- <http://naturalsociety.com/widely-popular-nanoparticles-could-be-giving-you-cancer-nutritional-deficiencies/>
- <http://www.foodengineeringmag.com/articles/89408-are-carbon-nanotubes-nanoparticles-safe->

Titanium Di-Oxide

Around two million tons of TiO₂ nanoparticles are produced every year worldwide. They are used as a white pigment in many everyday products like paint, cosmetics, sun cream, vitamins, food coloring and toothpaste, Scientists in several European Universities and Laboratories have found that TiO₂ nanoparticles cause similar effects to asbestos and silicone, activating the inflammasome NLRP3 – a complex mechanism responsible for activating inflammation processes – and releasing molecules capable of attacking DNA, proteins and cell membranes. It is claimed that “titanium dioxide accumulates in the lung, like asbestos particles. This may take 10 or 15 years before the cancer is detected,” says Jürg Tschopp, the lead researcher and professor of Biochemistry at Lausanne University ([http://www.swissinfo.ch/eng/...](http://www.swissinfo.ch/eng/))

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