

Nanotech: an Atomic, Molecular, and Supramolecular Scale for Industrial Purposes

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Editorial

Nanotechnology is a field of research and innovation concerned with building 'things' - generally, materials and devices - on the scale of atoms and molecules. A nanometre is one-billionth of a metre: ten times the diameter of a hydrogen atom. The diameter of a human hair is, on average, 80,000 nanometres. Nanotechnology also lowers costs, produces stronger and lighter wind turbines, improves fuel efficiency and, thanks to the thermal insulation of some nanocomponents, can save energy. The properties of some nanomaterials make them ideal for improving early diagnosis and treatment of neurodegenerative diseases or cancer.

Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers. Physicist Richard Feynman, the father of nanotechnology. Nanotechnology offers the potential for new and faster kinds of computers, more efficient power sources and life-saving medical treatments. Potential disadvantages include economic disruption and possible threats to security, privacy, health and the environment. Nanotechnology is already making new materials available that could revolutionize many areas of manufacturing. For example, nanotubes and nano particles, which are tubes and particles only a few atoms across, and aerogels, materials composed of very light and strong materials with remarkable insulating properties, could pave the way for new techniques and superior products. In addition, robots that are only a few nanometers in length, called nanobots, and nanofactories could help construct novel materials and objects.

Energy and Electronic Advantages: Nanotechnology may transform the ways in which we obtain and use energy. In particular, it's likely that nanotechnology will make solar power more economical by reducing the cost of constructing solar panels and related equipment. Energy storage devices will become more efficient as a result. Nanotechnology will also open up new methods of generating and storing energy. The field of electronics is set to be revolutionized by nanotechnology. Quantum dots, for example, are tiny light-producing cells that could be used for illumination or for purposes such as display screens. Silicon chips can already contain millions of components, but the technology is reaching its limit; at a certain point, circuits become so small that if a molecule is out of place the circuit won't work properly. Nanotechnology will allow circuits to be constructed very accurately on an atomic level.

Environmental Effects and Economic Issues: Some of the more extravagant negative future scenarios have been debunked by experts in nanotechnology. For example: the so-called "gray goo" scenario, where self-replicating nanobots consume everything around them to make copies of themselves, was once widely discussed but is no longer considered to be a credible threat. It is possible, however, that there will be some negative effects on the environment as potential new toxins and pollutants may be created by nanotechnology. It is likely that nanotechnology, like other technologies before it, will cause major changes in many economic areas. Although products made possible by nanotechnology will initially be expensive luxury or specialist items, once availability increases, more and more markets will feel the impact. Some technologies and materials may become obsolete, leading to companies specializing in those areas going out of business. Changes in manufacturing processes brought about by nanotechnology may result in job losses. Nanotechnology raises the possibility of microscopic recording devices, which would be virtually undetectable. More seriously, it is possible that nanotechnology could be weaponized. Atomic weapons would be easier to create and novel weapons might also be developed. One possibility is the so-called "smart bullet," a computerized bullet that could be controlled and aimed very accurately. These developments may prove a boon for the military; but if they fell into the wrong hands, the consequences would be dire.