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Nanotechnology for mankind and environment - Seize upon opportunities, reduce risks

Federal Environment Agency with information on environmental aspects

Nanotechnology is playing an ever greater role in the development of new products and applications. Synthetic materials optimised through nanotechnology can reduce the weight of cars or aeroplanes, for example, and thus help to save fuel. New lamps optimised by nanotechnology—so-called light-emitting diodes (LED)- have a long lifetime, convert electricity more efficiently into light, which also helps save energy. These are but two examples in a rapidly growing number of products being launched on the market which are presumed to have a positive impact on the environment and the economy. The rising use of synthetic nanomaterials in products, however, also leads to their increased input to the environmental media soil, water and air. There is as yet too little knowledge about the impact of nanomaterials on the environment and their potential health risks for humans. The Federal Environment Agency (UBA) presents a background paper with knowledge of relevant aspects of nanotech's potential to relieve the environment. The paper also identifies risks posed to mankind and the environment and defines recommendations for action.

Nanotechnology deals with the production and application of processes and nanomaterials composed of structurally definable particles on a scale of 100 nanometres (1 nm = 10⁻⁹ m) or less in at least one dimension; in other words, more than 1,000 times smaller in diameter than a human hair. At this scale physical and chemical properties of materials change, and this change can be applied in a variety of ways to develop new types of products and applications. The influence of nanotechnology can already be felt in many areas of industry, including the automotive industry, engineering, the chemicals and food industries, and the biotech and environmental technology fields. There are currently over 800 nanotech companies operating in Germany alone.

Although nanotechnology holds significant potential for ecological product innovations, it also harbours risks for the environment and human health. There is a serious lack of knowledge on the topic and therefore a broad-ranging need for research and regulation. It also requires a transparent assessment widely recognised by industry, research and public authorities of the processes and products associated with nanotechnology in terms of its pros and cons for the environment and human health. Producers are called upon to make conclusive information

available about the effects of and exposure to their products, and to report on their potential to relieve the environment. UBA's recommendation is as follows: any use of products that contain or might release nanomaterials should be avoided if at all possible as long as their effect on mankind and the environment is largely unknown.

The Federal Environment Agency believes there must a legal framework put in place that ensures safe handling of nanomaterials. One step in this direction is a reporting system for nanomaterials in the form of a product directory.

Public debate about opportunities and risks has gained momentum in recent years among expert groups as well as the general public. The federal government reacted early on by setting up a 'nanocommission', whose members include experts at UBA who are also part of other national and international working groups (most notably the OECD) that develop recommendations on how to handle nanomaterials responsibly.

UBA is playing an active part in providing information about the environmental aspects of nanotechnology, closing the knowledge gap, and identifying any need for further action. The Agency encourages environmentally conscious innovations that are made possible through the use of nanotechnology and is concerned with identifying its potential for environmental relief. This is on condition, however, that potential risks for the environment and human health can be assessed and avoided.

More detailed information is in the background paper *Nanotechnik für Mensch und Umwelt - Chancen fördern und Risiken mindern [Nanotechnology for mankind and environment - seizing opportunities and reducing risk]*. It is available for free download from the Internet at http://www.umweltbundesamt.de/uba-info-medien/mysql_medien.php?anfrage=Kennnummer&Suchwort=3765.

Dessau-Roßlau, 21 October 2009