

Focus on IFA's work

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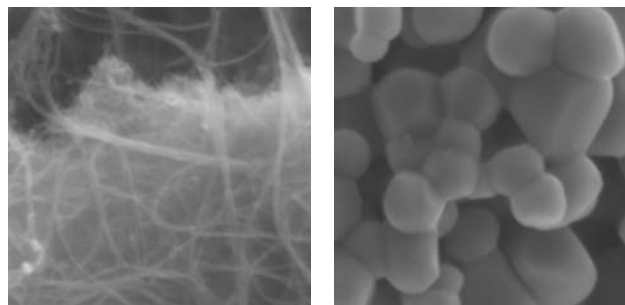
Ultrafine aerosols and nanoparticles at the workplace

Problem

Nanotechnology is regarded as a technology of the future. Nanoparticles are already being used in many products, such as sunscreen and composite materials for sports equipment. The worldwide value of products containing nanoparticles is expected to rise to US\$1 trillion by 2015. The areas of application range from medicine, through surface finishing, to materials science and the chemical industry.

"Nanoparticles" is the colloquial term for objects with two or three dimensions of between 1 and 100 nanometres (nm) and manufactured specifically for their particular properties. In the OSH sector, nanoparticles are distinguished from ultrafine particles (UFPs), which have similar dimensions but are produced incidentally, for example during combustion processes. The atmospheric limit value for the respirable dust fraction explicitly excludes UFPs; a workplace limit value does not therefore exist, either for UFPs or for nanoparticles. In addition, the transport and mode of action of the particles within the human body remain inadequately researched. This is a serious obstacle to assessment of workplace exposure.

Particular attention is currently being paid to fibrous nanoparticles such as carbon nanotubes (CNTs). Some of these CNTs may satisfy the definition for WHO fibres (length > 5 µm, diameter < 3 µm, length to diameter ratio > 3:1).



Left: single-walled carbon nanotube; right: titanium dioxide (scanning electron microscopic image of nanostructured material); image: Finnish Institute of Occupational Health (FIOH)

Whether the health hazard presented by these CNTs is comparable to that of other WHO fibres is the subject of current research.

Activities

The IFA is a partner in a number of projects and measurement programmes. For example, the EU projects Nanosafe2 and NANOSH are specifically studying exposure to nanoparticles, whilst a measurement programme conducted by the German accident insurance institutions is concerned with exposure to ultrafine dusts. The knowledge and experience gained will be contributed to German and international working groups and standards committees, in order for a co-ordinated procedure to be implemented for the measurement and assessment of exposure to nanoparticles.

A summary of the current state of knowledge is provided by the IFA's Internet portal on ultrafine aerosols and nanoparticles at the workplace, which has been online since mid-2009.

Results and Application

The home page of the Internet portal provides an introduction to the subject, and states the essential definitions and conventions. In addition, the current state of discussion on the subjects of limit values/assessments and toxicology is explained, and the current techniques and methods for measuring UFPs and nanoparticles are described. Important information, for example for OSH professionals, is provided in the section on protective measures against ultrafine aerosols and nanoparticles at the workplace. The section also includes information on the effectiveness of respiratory filters and other personal protective equipment. A section on the effectiveness of protective measures identifies and discusses provisional criteria for their evaluation, in consideration of the results of German and foreign research and workplace measurements.

Area of Application

Employees in companies which manufacture or apply nanomaterials, particularly management personnel; OSH professionals and company physicians with responsibility for occupational safety; persons involved in research into nanoparticles and occupational safety and health

Additional Information

www.dguv.de/ifa, Webcode e95204

Expert Assistance

IFA, Division 3: Hazardous Substances: handling
– protective measures