IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

0409

Focus on IFA's work

Issue 05/2020 617.1-IFA:638.3

Nanostructured materials: grouping with regard to occupational safety and health and risk minimization

Problem

Nanotechnology opens up a multitude of new applications in a range of industrial sectors. The challenge for occupational safety and health lies in estimating the risk for workers performing activities involving nanomaterials. Owing to the variety of nanomaterials in question, some of which have been used for decades and in numerous modified forms, decisions are often made on a case-by-case basis, associated with considerable investigations. This has prompted bodies and institutions from research, industry, government and accident insurance to join forces in the "nanoGRAVUR" project, funded by the German Federal Ministry of Education and Research (BMBF), in order to draw up groupings for nanomaterials in terms of their hazard and risk potential.

Activities

The IFA was involved in half of the work packages in the project and bore responsibility for the package of risk grouping for occupational safety and health. Literature sources, experience gained in other projects and a number of risk assessment concepts were first evaluated, termed "control banding instruments". These concepts enable the risk to be classified in only a few steps. Based upon the data collected, matrices were created for activities involving nanoparticles in fibrous, granular and platelet form respectively. The matrices are used for estimation of the risk. At the same time, the IFA studied release and exposure under industrial conditions.

Test chamber for simulation of activities involving nanoparticle composites (image: IFA).

In conjunction with the Technical University of Kaiserslautern, representative nanoparticles were embedded in a number of composites (epoxide, polyamide, polypropylene), and a test chamber was set up. Rates of release were simulated in the test chamber under realistic but reproducible working conditions and the exposure of workers determined according to the work process, for example during grinding work. In addition, the German Federal Institute for Occupational Safety and Health (BAuA) and the Institute for Research on Hazardous Substances (IGF) of the German Social Accident Insurance Institution for the raw materials and chemical industry (BGRCI) examined and compared the suitability of measuring instruments and test apparatus for determining the dustiness properties.

Results and use

The nanoGRAVUR project has taken up the key aspects of the BMBF's WING framework programme concerning innovative materials for industry and society, and in addressing the occupational safety and health aspects has particularly considered that of pulmonary exposure. The proposed grouping of nanoparticles permits a simpler and at the same time differentiated assessment of nanomaterial at the workplace. The combined measurement methods, which determine both the number concentration and the mass, and the strategies for measurement and evaluation which were trialled, can contribute to an improved assessment of the exposure. The benchmark levels proposed by the IFA for the number concentration of nanoparticles can be used as a cut-off criterion for the classification of materials and processes. The results also show the concept of control banding to be suitable for prioritizing and estimating the risk presented by activities involving nanomaterials. Certain improvements to the existing control-banding instruments were proposed, however.

The findings of the project have been incorporated into the recommendations of the German Social Accident Insurance Institutions and the revised version of the Announcement on Hazardous Substances (BekGS) 527 concerning manufactured nanomaterial. At international level they will be considered during the development of standards and guidance documents of the Organisation for Economic Cooperation and Development (OECD) and the European Union, particularly in connection with the REACH Regulation.

User group

Occupational accident insurance institutions, labour inspectorates of the German regional authorities, test bodies, occupational safety and health organisations, training/further training establishments, OSH professionals and OSH delegates, employers, employees' representative bodies, industry and professional bodies.

Further information

- Information on nanoGRAVUR and further projects: https://nanoobjects.info/en/projects/completed-projects/nanogravur-project-en

- Technical information from the IFA https://www.dguv.de/ifa/nano

Technical enquiries

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

Literature enquiries

- IFA, Central Division

Published and printed by:
Deutsche Gesetzliche Unfallversicherung e. V. (DGUV), Glinkastrasse 40, 10117 Berlin, Germany

ISSN (Internet): 2190-006X

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