

Elaboration of new principles of nanoparticle health risk assessment in dusty occupational environments/workplaces

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The rapid increase of use of nanomaterials and risks they pose both the workers and end users has been recognised as one of the “new and emerging” risks by the European Agency for Safety and Health at work. Still despite the numerous possibilities for measurement and assessment of various particles and elaborated mechanisms to set up occupational exposure limits at workplaces there is still no recognised and tested approaches for measurement of nanoparticles and assessment of their exposure especially in real time workplace environments and research in this area is recognised as one of the European priorities. This is especially important as there is increasing evidence on potential toxicity of nanomaterials. There is widely acknowledged lack of established measurement standards as well as low-cost affordable equipment and instrumentation. Most of current research is analysing such nanoparticles as TiO₂, ZnO and carbon nanotubes intended to characterize nanoparticles and test their toxicity mostly for theoretical and scientific purposes. Still there are very few studies on practical evaluation of nanoparticles from other materials and their health effects in workplace environment. Therefor the project “The development of up-to-date diagnostic and research methods for the risks caused by nanoparticles and ergonomic factors at workplaces”, Agreement No. 2013/0050/1DP/1.1.1.2.0/13/APIA/VIAA/025 has been started with the aim to develop and test new methods for nanoparticle identification, characterization and exposure assessment in several industries where engineered nanoparticles are part of the production process (e.g. welding fume and paints in metal industry or wood dust in grinding and sanding in woodworking industry). Various methods of measurements (e.g. by using ELPI+ nanoparticle counter) have been tested in workplaces for their practical application and for quantification and assessment of nanoparticles (including full chemical analysis and scanning electron microscopy). For evaluation of health effects use of nasal lavage fluids have been used with full immunological analysis supported by analysis of clinical health status.