6th International Symposium on Nanotechnology, Occupational and Environmental Health

The aim of the symposium is to provide a scientific forum for researchers and practitioners to present and discuss the latest researches on occupational and environmental health issues of nanotechnology.

Date: **October 28 (Mon) → 31 (Thu), 2013**

Place: **Nagoya, Japan**

Venue: **Nagoya Congress Center**

Topics

- **Nanomaterial processing and characterization**
- **Health effects and toxicity (in vivo, in vitro)** of manufactured nanomaterials
- **ADME** (Absorption, distribution, metabolism and excretion) and methodology for **kinetic study** of manufactured nanomaterials
- **Environmental toxicity** of manufactured nanomaterials
- **Exposure assessment** in the workplaces producing or handling manufactured nanomaterials
- **Risk assessment** of manufactured nanomaterials
- **Risk management** of manufactured nanomaterials
- **Outreach** for occupational and environmental health in nanotechnology
- **Epidemiology** on the workers exposed to manufactured nanomaterials
- **Worker protection**: Identifying and training the nanomaterial workforce




Organizers

Japan Committee for the 6th International Symposium on Nanotechnology, Occupational and Environmental Health / Planning Committee for the International Symposium on Nanotechnology, Occupational and Environmental Health

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O-29-B-07 Assessment of occupational exposure to AuNPs during their synthesis in a research and development laboratory

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The synthesis and subsequent use of nanoparticles in a wide variety of applications is one of the rapidly expanding research areas in South Africa. This in turn has led to an increasing likelihood of occupational exposure to these nanoparticles in research and development laboratories in the country. The aim of this survey was to perform an exposure assessment during the synthesis of AuNPs using the citrate reduction method.

The exposure assessment survey was conducted during the synthesis of an 80L of 14nm AuNPs using a citrate reduction method of chloroauric acid. A combination of particle number concentration measurement was used including filter based (personal and area) sampling and a Nano ID Select to collect airborne particles for further characterization. Real-time particle concentration was measured before and after synthesis.

Preliminary results indicate that nanomaterial particle number did not increase appreciably during the tasks monitored. Only after 30 minutes after the addition of the citrate solution was there an increase in the number of nanomaterials measured by the SMPS (7-298nm). The observed increase was almost twice the calculated local particle reference value. Transmission Electron Microscopy (TEM) was used for particle size distribution determination, Energy Dispersive X-ray Spectroscopy (SEM-EDS) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS) for elemental analysis of particles collected in air and personal samples. These results are subsequently used to determine exposure to AuNPs during their synthesis in a research laboratory.

O-29-B-08 Brake wear dust sample analysis

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Brake wear dust is one essential component from traffic emission and could contribute substantially to air pollution. In a previous study, we showed strong oxidative stress caused by freshly generated brake wear dust. Here, we were interested in residues of dust present in brake drums. We analyzed seven brake wear samples from small passenger vehicles. They were characterized by scanning electron microscopy techniques, Energy Dispersive X-ray (EDX), carbon and metal analysis. Moreover, the oxidative stress generation potential was characterized using both cellular and acellular approaches. We found these residual brake wear particles to be heterogeneous particle mixtures. Opposite to the freshly generated particles, only few nanoparticles were detected. The particles consisted of metal and few other elements. High oxygen concentrations in EDX-spectra suggested that the metals were strongly oxidized. The shapes and forms of the particles suggested that some were generated from heat transformation while others showed abrasion marks. Small amounts of reactive oxygen species were generated in the cell free fluorescent test while the cells were not dramatically activated by the concentrations used. In conclusion, not too much reactive oxygen species were produced by this type of brake wear dust that was retrieved from brake drums. This may be related to the high oxidation state of the particles, or the larger average size and thus smaller surface as compared to freshly generated nanosized brake wear particles. Current work practice recommendations that include normal ventilation, washing brake drums, and avoiding pressurized air seems to be sufficient to protect people servicing brake drums in garages.