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-C-10 Development of an system to test the stability of airborne nanoparticle agglomerates

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The stability of nanomaterial agglomerates is an important parameter for toxicological studies and for estimating the particle size of airborne nanomaterials. The aim of this study is to develop a system that effectively determines the potential of different type of nanomaterials to deagglomerate within a wide range of applied energies.

The aerosolization is achieved by fluidic agitation of nanopowders. Humidity controlled air can be introduced to allow studying the humidity dependence of aerosol stability. The pressure change and air speed is carefully controlled to ensure a range of shear forces can be applied onto the particles in a critical orifice. The aerosol is measured in a stabilization chamber by the SMPS for particle size distribution and is collected on the TEM grids for morphology analysis.

Stable generations of silica aerosol were successfully obtained. The particle number and size distribution showed associations with the air flow supplied. Thus the flow rate needs to be carefully controlled owing to the "flow-dependant" nature of this system. Different air speeds were generated to activate the powder in order to study the deagglomeration potential at the moment the aerosol is generated. The initial experiments indicate that the particle size is reduced if high speed air flow impacts the powder, but this has to be verified with further tests.

The preliminary results suggest that we are able to generate stable aerosols for later treatments under different conditions. Next, different orifices will be employed to apply shear forces onto the agglomerates. Various humidity conditions (30%-70%) will allow insights of aerosol stability related to this factor. In addition, different nanopowders will be tested to assess the robustness of the system.

O-29-C-11 Enhanced Nanoparticle Diffusion Loss due to Recirculation Flow in the Aerosol Particle Mass Analyzer

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The aerosol particle mass analyzer (APM) is used to measure the density and mass distribution of aerosol particles based on their mass-to-charge ratio. The theoretical response spectra of the APM model 3600 agree well with the experimental data for submicron particles larger than 100 nm in electrical mobility diameter but not nanoparticles (Tajima et al., 2011). The diffusion loss of nanoparticles in the APM was suggested to be the cause of over-estimation in the peak values of the spectra. To resolve this issue, this study used 2-D numerical model to predict the transfer function of the APM based on the detailed simulation of the flow and particle concentration fields. It is found that flow recirculation occurs inside the annular classification region created by the tangential flow, which leads to an enhanced diffusion loss of nanoparticles compared with non flow recirculation consideration. The simulated transfer functions fit well both in shape and peak values with the experimental response spectra shown in Tajima et al. (2011) for both nanoparticles and submicron particles. For example, for the classification performance parameter ホサ of 0.22, the peak values in the theoretical transfer functions are 6.9 and 2.0 %, higher than those in the experimental response spectra for 29 and 48 nm PSL particles, respectively, which is a substantial improvement from the large overestimation of 37.1 and 34.1 %, respectively, if the parabolic flow profile is assumed. Since the flow recirculation only enhances the diffusion loss of nanoparticles, commonly assumed parabolic flow profile in the annular region is also able to result in a very good agreement between the simulated transfer functions and the experimental data for submicron particles larger than 100 nm.