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-30-A-17 Biosensing tools based on enhanced absorbance to assess the impact of nanomaterials on health

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Hydrogen peroxide (H2O2) is a major reactive oxygen species known to play a key role in the oxidative stress paradigm. Considering the production/use of nanomaterials at an industrial scale, there is a noticeable need for sensitive analytical tools providing quantitative information on H2O2 levels present in human fluids, or excreted by exposed cultured cells, or catalytically produced by reactive nanomaterials (exogeneous origin) in order to evaluate/predict their potential effect on health. The biosensing strategy presented here enables the development of a series of optical tools for H2O2 detection which are highly sensitive, cheap and versatile. The detection principle relies on enhanced absorbance generated by the elongation of the optical path of an incident light propagating in a highly scattering medium loaded with an absorber. In practice, a hemoprotein is immobilized into a scattering structure such as light pathway modifying insert or hydrogel. A first configuration is adapted to 96-wells microplates in which enzyme-modified light pathway modifying inserts are placed in the bottom of each well and the change in absorbance at specific wavelength after sample addition is amplified by one order of magnitude in comparison to measurements in solution. Further increase is observed when the sample is forced to flow through the sensitive membrane using pierced wells. In another version adapted to in vitro toxicology, cells are grown on a 6-wells transwell microplate and the lower compartment is modified with a H2O2-sensitive film made of alginate doped with hemoprotein. Such biosensing approaches might be particularly suitable to analyse H2O2 content in exhaled breath condensate or provide real-time information on endogeneous H2O2 being excreted by stimulated cells.

O-30-A-18 Hydrochemical reactivity and biodurability of nanomaterials in cell media and synthetic lung fluids

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Understanding manufactured nanomaterial (MN) toxicity may require better understanding on how MNs react and dissolve in specific cell media and biological fluids. A 24-well SDR (Sensor Dish Reader) system was used for screening the 24-hour pH and O2 reactivity and dissolution of MNs in various cell media and Gambles solution (GS); a synthetic lung lining fluid. A cell incubator was used to maintain the SDR test conditions (5% CO2, 37C). A Temperature-pH-controlled Stirred flow-cell Batch Reactor (ATempH SBR) with online pH-control and monitoring of redox potential was used tests at fixed lung lining (pH 7.4) and phagolysosomal (pH 4.5) pH conditions. The test conditions in the reactor were maintained by a thermostat (37C) and bubbling of CO2 adjusted air into the suspension. ATempH SBR tests were only made using GS and synthetic phagolysosomal fluid (PSF). Test MNs included (Al2O3, synthetic amorphous silica, TiO2, Fe2O3, ZnO, Ag, CeO, and Multi-Walled Carbon Nanotubes) of which 17 MNs were from the OECD Working Party on Manufactured Nanomaterials (OECD WPMNM). Most MNs have weak causticity, but in SDR tests, the pH levels may vary at least 2 pH units due to whole-test system variations. Considerable effects on O2 and the redox-potential were observed for several MN. Some MWCNT were among the most reactive. The dissolution of MN varies considerably with MN type, test media and pH-conditions. Al2O3. TiO2 has very low solubility, but coatings may dissolve in all media. Ag, amorphous silica, and ZnO show large variations in solubility depending on the test media and pH. Generally, the solubility is highest in the low pH PSF. Transition metal catalyst particles in MWCNT were found to be partially dissolved and may behave differently from the MWCNT.