

**HEI Annual Conference 2007**

**Combustion and Engineered Nanoparticles**

Concluding remarks on research needs

H. Greim

- Characterization: < 100 nm, but there is agglomeration.
- Composition, surface, size, shape and agglomeration determine function, toxicity and environmental impact.
- Most information from carbon black, TiO<sub>2</sub>, or from non-intended emissions like Diesel exhaust, but there are numerous other NP sized materials.

**Size, surface and chemical composition determine toxicokinetics and toxicity.**

Decrease of diameter

- increases surface
- reduces gravity
- affects site of deposition in the lung and increases ratio between diffusion and deposition
- may increase passage (passive and active?) through cellular and intracellular membranes (epithelial-endothelial), (olfactory) nerve axons and by that CNS, mitochondria, nucleus?: artifacts, non-significant or relevant amounts?

**Size, surface and chemical composition determine toxicokinetics and toxicity.**

Surface affects

- reactivity
- binding of compounds
- agglomeration

Chemical composition determines

- durability
- substance specific toxicity

**Research and Development**

- Is lung toxicity qualitatively similar to larger particles?  
Airways: inflammatory reactions, secondary genotox?
- Direct or indirect effects on other organs?  
(vascular endothelium: thrombogenesis, atheromatotic plaques; olfactory nerves and CNS, autonomic nerves and heart rate? Skin penetration, intestinal absorption?)
- Need for reliable methods to simultaneously determine number, surface area and mass.
- Life time of NP in the environmental compartments
- Stability of agglomerates in the lung, GI-tract, skin

**Research and development for regulation of NP**

Development of a generally accepted test strategy such as physical/chemical characterization, in vitro + in vivo short term testing

Regulation of a defined NP material in analogy the approach of DECOS and SCOEL to regulate fibers?

Criteria to regulate the ecotoxicological consequences of NP

Thank You