

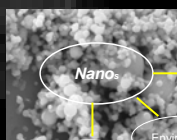
Dealing with industrial (sub)micrometric particles: A framework for nanopollution prevention

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INTRODUCTION

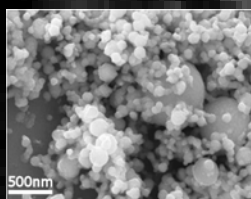
In the frame of Cemicro - The Portuguese Micromanufacturing Network (www.micromanufacturing.eu), attention is being given to the potential nanomaterials have for technological leapfrogging. Integrated strategies are required to create a fair playing field regarding nanomaterials in a resource efficient and safer Society. Our framework looking forward to building insights and conditions for sustainable consumption and production patterns. For such purpose, different methods and tools are considered such as cause-effect analysis, particle size measurement and behavior, environmental toxicity, and life cycle assessment.

In particular, particle size, shape, surface area and surface characteristics are key issues in nanoparticles behavior. Challenging work needs to be done at different levels, e.g.: on processes, on powder characteristics, or on the nano-bio interactions, as well as on its environmental fate.

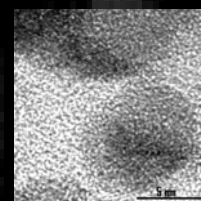
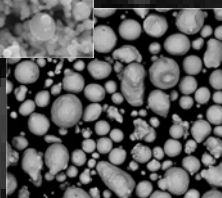


- Unbound materials; functionalized forms; sub products
- Emissions: sources & Dispersion
- Environmental Control
- Ecotoxicology
- Partition & Transformation
- Transport & Fate
- Persistence & Bioaccumulation
- Life cycle assessment
- Sustainable production & consumption

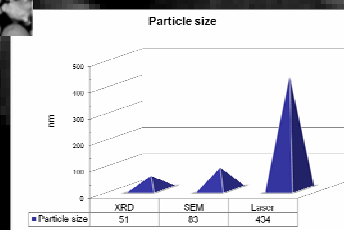
Particle size characterization studies



Nano powders



Nano powder filter



METHODOLOGY

➤ EMISSIONS & WASTES: SOURCES, DISPERSION & PREVENTION

- o Raw materials, transformation, production
- o Cause-effect analysis
- o End of life and fate

➤ PARTICLE CHARACTERIZATION

- o Particle size measurement
- o Image analysis
- o Condensation nanoparticle counting

➤ ECOTOXICOLOGY

- o Development in aquatic ecotoxicity tests

➤ LIFE CYCLE MANAGEMENT

- o Materials and products
- o Impact assessment (areas, categories)
- o Characterization factors

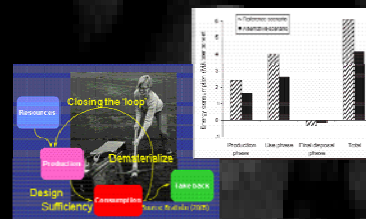


Ecotoxicological studies with nanodiamond suspensions



Morphological aspect of *Daphnia magna* after 48h exposure to nanodiamond suspension (left) and control (right).

Life cycle assessment of products



PERSPECTIVES

Efforts are being undertaken in the working fields identified above, in order to consistently explore adequate tools and methods (current, new), and to build the required knowledge to support the design, use and assessment of products containing nanomaterials.