NANOINNOVATION 2019

Session: *Biosafety of nanomaterials (13-June-19, 16:00- 17:30)*

Toxicity of metal oxide nanoparticles in vitro and in vivo: a safe-by-design approach

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Nowadays nanotechnology reached out a huge expansion in many fields of application, including the biomedical area. In particular, metal oxide nanoparticles (NPs), thanks to their antibacterial properties, have great potential in the prevention of nosocomial infection in hospitals. Nevertheless, there is a growing concern about the safety of these nanomaterials (NMs). In this perspective, in order to guarantee a sustainable development of these new technologies, the environmental and health safety issues should be addressed in parallel. In this presentation, the relevant tools and concepts employed to evaluate the effects of metal oxide NPs on human health and environmental organisms will be disclosed. Furthermore, it will be presented how it is possible to modulate the interactions and toxicity toward non-target cells and organisms, by regulating NPs shape, size, structure or surface functionalization. This general overview on metal oxide NPs has the major aim to evidence how actually NPs physico-chemical properties contribute to both the positive and the negative sides of these innovative materials. Different *in vitro* and *in vivo* case studies will be presented, focusing on the main routes of exposure to NMS: skin contact, ingestion and inhalation. All together, the data evidence that a strict cooperation between the efforts in life cycle assessment and experimental researches – including exposure and hazard assessment – has a crucial role in fulfilling the knowledge gaps and in ensuring a safe and sustainable design of NMs.