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Published in:
Abstracts - 8th international symposium on nanotechnology, occupational and environmental health

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Ecotoxicity testing of nanoparticles – The quest for disclosing the nano-effect

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While the literature on ecotoxicological effects and uptake of ENPs is rapidly expanding, the applicability of reported data of ENPs for hazard assessment purposes is questionable. A major knowledge gap is whether nanoparticle effects occur when test organisms are exposed to ENPs in aquatic test systems. This knowledge gap is not straightforward to fill, due to the high variability in ENP types, and the different behavior of ENPs compared to "ordinary" (dissolved) chemicals in the ecotoxicity test systems. The risk of generating false negative, as well as false positive, results in the currently used tests is high, but in most cases difficult to assess. Based on a literature review, this presentation outlines some of the pitfalls in aquatic toxicity testing of ENPs which may lead to misinterpretation of test results. In this paper, we are describing the effect of nanoparticles towards aquatic organisms. The presentation revolves around three response types that are not directly related to the nanoparticle per se, but which can mask that nanoparticle effects can be quantified. These response types are

1. Physical effects caused by attachment of nanoparticles,
2. Dissolution of nanoparticles leading to toxic effects corresponding to that of ions, and
3. Uptake, internalization and translocation of nanoparticles.

We further propose that already known toxic modes of action should be carefully characterized and quantified before claiming that novel nanoparticle effects have been discovered.