Nanosafety Knowledge Infrastructure (NSKI)
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Nano Safety in the Environment: Future Needs

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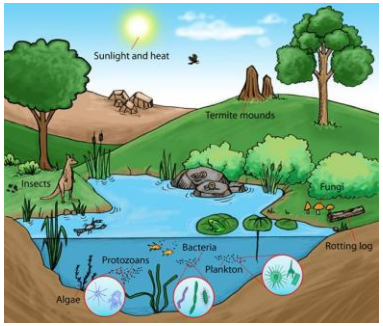
What we do know



- Nanomaterials reach the environment via different means and pathways
- Environmental species are exposed
- The form of the “nanoproduct” (material containing NMs) reaching the environment is varied
- Effects have been observed and these depend on material, coating size, shape, model...
- Effects of metal NMs cannot always be solely apportioned to dissolution
- NMs can be passed via the food chain
- NMs can be associated and ‘carried’ by other chemicals (“trojan horse”)

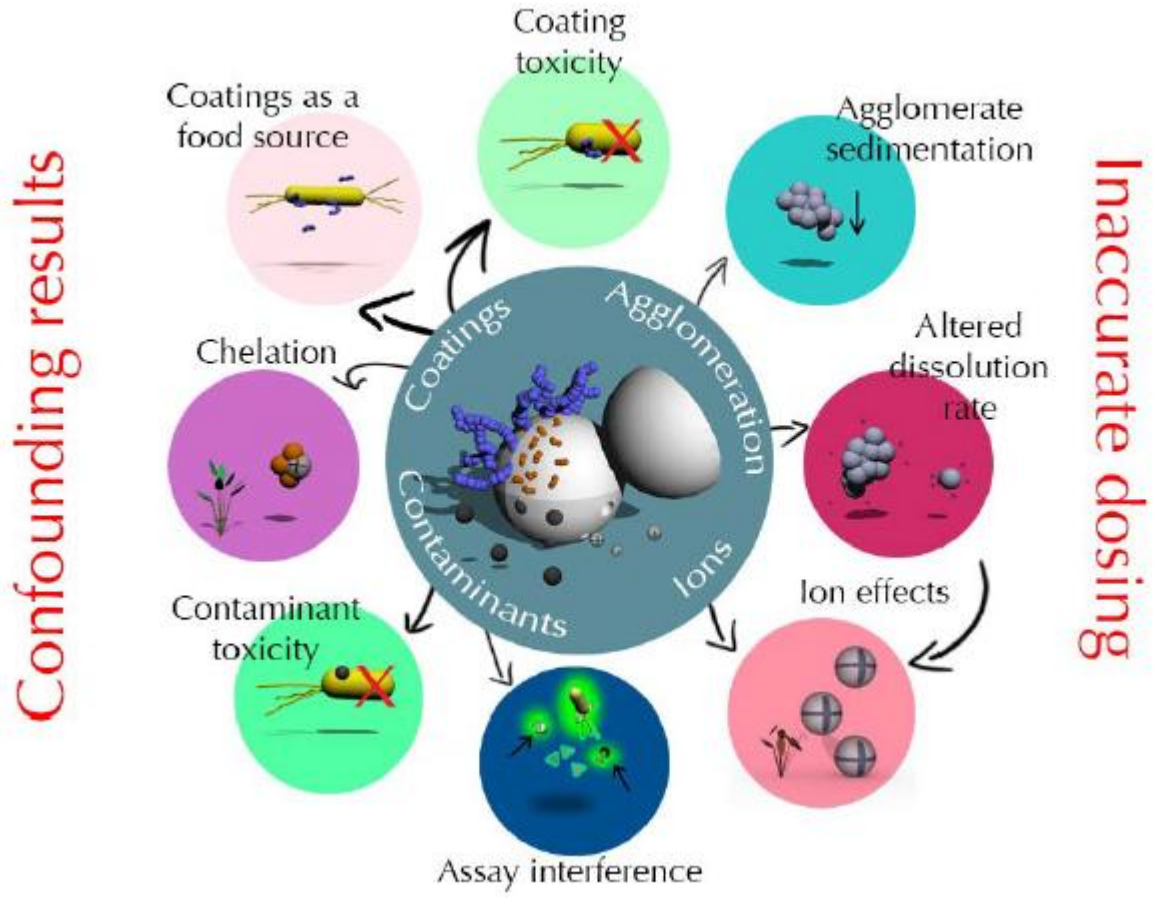
What is missing

- Making (better) sense of the data collected
- Provision of clear information on “do’s” and “don’t’s” regarding approaches and assays appropriate (or not) for the assessment of nanosafety (potential artefacts)
- Good characterisation through the tests so that cause-effect can be assessed and correct interpretation made
- Tests of ‘real products’ (what is ‘aged/weathered’?); how do tests of NMs link to tests of ‘real nanoproducts’
- Long term tests, comprehensive set of models
- Ascertain if there are specific ‘nano’ effects
- More data needed on food chain/mesocosm/trojan horse
- Acknowledgement that characterisation in complex media (e.g. soils and sediments) is very difficult

Future Directions

- Continued good interaction between biologists and material scientists – through the manufacture of specific NMs that can be tracked, for example, or to follow up in any ways, and good characterisation through exposures
- Access to “centres of excellence” – biology, visualisation (e.g. ability to detect uptake and localisation), characterisation (in media and biological system), etc
- Establishment of good assay guidelines, suitable for NMs and avoiding any artefacts
- Good capture of all these data and information
- Continued development of appropriate modelling approaches
- Good interaction with data base providers so that all of these information and data are captured optimally

Nanomaterials in the Aquatic Environment: an EU-USA Perspective on the Status of Ecotoxicity Testing, Research Priorities and Challenges Ahead



Selck, Handy, Fernandes, Klaine, Petersen (2016), ET&C

Recommendations for overarching research topics, which will reduce uncertainty in NM environmental risk assessment

- Emphasis should be placed on studying the ecological effect of aged/weathered NMs, as-manufactured NMs and NMs released from consumer products in addressing:
  - NM characterization and quantification in environmental and biological matrices
  - NM transformation in the environment and possible consequences for bioavailability and toxicity
  - The development of realistic methods to assess exposure
  - The influence of exposure scenarios on bioavailability and toxicity
  - The development of environmentally realistic bioassays
  - The uptake, internal distribution and depuration of NMs

- Due to the complexity of nanosafety research, an interdisciplinary approach is key to moving this area forward.

Selck, Handy, Fernandes, Klaine, Petersen (2016), ET&C

OECD Work on the Safety of Manufactured Nanomaterials

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GUIDANCE DOCUMENT ON AQUATIC (AND SEDIMENT) TOXICOLOGICAL TESTING OF NANOMATERIALS

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