

## **Grouping of nanomaterials regarding their ecotoxicity – are hypotheses based on literature data robust enough?**

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Nanomaterials (NM) offer a great innovation potential and are assumed to be beneficial to mankind and the environment by e.g. reducing material usage and energy consumption. However, the large variety of synthetic nanomaterials represents a major challenge for scientists and regulators in terms of measuring and assessing the potential hazard caused by the materials and the products over the whole life-cycle.

Currently, the assessment of potential hazards posed by NM towards environmental organisms is assessed on a case-by-case basis, which is considered as not practicable to be performed for the many different variations of NM, which involve differences in composition, size, shape, crystalline structure and surface modifications. In order to overcome the need for extensive testing grouping and read across approaches for NM are discussed, enabling risk assessors to predict the hazard of an NM based on existing knowledge on similar NMs. This requires the identification of relationships between nanomaterials' physicochemical properties and their ecotoxicological behavior.

To gain knowledge on this relationship, we performed an extensive literature research taking into account ecotoxicological studies either involving several organisms and / or several modifications of the same type of NM. This allowed us to reveal parameters crucial for the emergence of specific ecotoxicological effects. The set of parameters identified as relevant included the surface properties (charge, zeta potential, surface modifications), the size and shape of a NM, and the release of ions. Based on these findings, a test set of NM, involving in most cases several subtypes of a given NM was compiled, which underwent testing in the ecotoxicological relevant aquatic (algae, daphnia and zebrafish embryo) and terrestrial organisms (earth worm, microorganisms). Subsequently, the initial grouping hypotheses were compared to the actual results obtained in the tests in order to verify or falsify initial grouping hypotheses.

Even though several predictions could not be confirmed, a first evaluation of results shows that inert and ion-releasing NM needs to be considered differently. Acknowledgement - Funding of the project nanoGRAVUR by the German Federal Ministry of Education and Research (BMBF), Grant No. 03XP0002 is acknowledged.