# Risks hidden in nanoparticles for estuarine organisms

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We are living in an era with explosive increase of engineered nano-sized materials (NMs). They differ significantly from those at a larger scale (e.g. unique optical, electrical, chemical properties), being involved in industrial technology breakthroughs for having the potential to improve the quality of life and to contribute to industrial competitiveness. NMs are evolved in lots of industries and applied in various categories of consumer products, cadmium sulphide nanoparticles, or CdS NPs are among those ones. Once these products discarded, discharges of these waste products containing NMs almost follow the same destiny: Via surface water or groundwater transportation, they are deposited in estuaries before seawater dilutes the effluents. It is already known that Cadmium (Cd) is a neurotoxic metal that can be harmful to human and the environment. However, less is known about the toxicological effects of NMs, not to mention CdS NPs' impacts on other organisms from the aspect of both ecology and toxicology, also ecotoxicology.

For the latter objective, this study, as part of EU's 7$^{th}$ Framework Program on NPs' ecotoxicity, presents how CdS NPs can be harmful to widely distributed benthic organisms in estuary sites in France, a ragworm (*Nereis diversicolor*) and a bivalve (*Scrobucularia plana*). Adverse effects of ionic Cd was also considered as a comparison. Animals were exposed to this contaminated environment with either CdS NPs or ionic Cd. The exposure period was as short as 2 weeks. Very low concentration of contaminants was used, for the sake of simulating environmentally relevant condition. Not surprisingly, it was observed that both ragworms and bivavles showed fewer activities in feeding and burrowing behaviors at different degrees, which are crucial to species' survival in changing environment. Especially the bivalves showed reduced burrowing activities, which could increase chances of them captured by predators. This could further lead to worse circumstance like extinction of local species.

With the objective of improving environmental risks assessment of nanoparticles, this research gives a convenient approach in detecting the harmful effects of cadmium sulphide nanoparticles to estuarine invertebrates. Further research includes detecting dissolved fraction of metals, as well as subsequent chemical and DNA analysis of the tissues from the test organisms, which will give more in-depth knowledge of ecotoxicology facts of this material.

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