

Ecotoxicology at the Nanoscale

Fate, uptake, transfer and effects of nanomaterials

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Background

The past decade has seen rapid advancements in the engineering of nano-scaled (1-100 nm) materials (ENMs), and their global production volumes continue to increase. On the flipside of the benefits that nanotechnology may bring to today's world, we must consider the potential impacts on ecosystems that can result from the environmental release of ENMs. Our group aims to investigate the ecotoxicity of ENMs by studying whether and how nanomaterial properties such as **particle size**, **morphology**, **surface area to volume ratio** and **surface modifications** can induce toxicological effects at different levels of biological and ecological organization. In this poster we show examples of recent work in our group and provide an overview of our aims for the future.

By combining insights on fate and uptake processes...



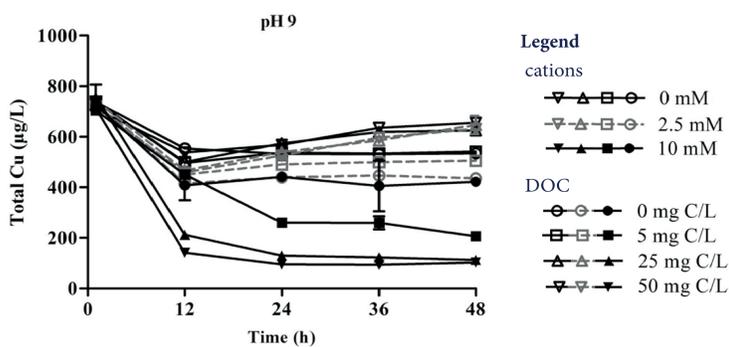
...and effects at increasing levels of bio- and ecological organization...



...we ultimately aim to predict risks of ENMs in environmentally relevant contexts.

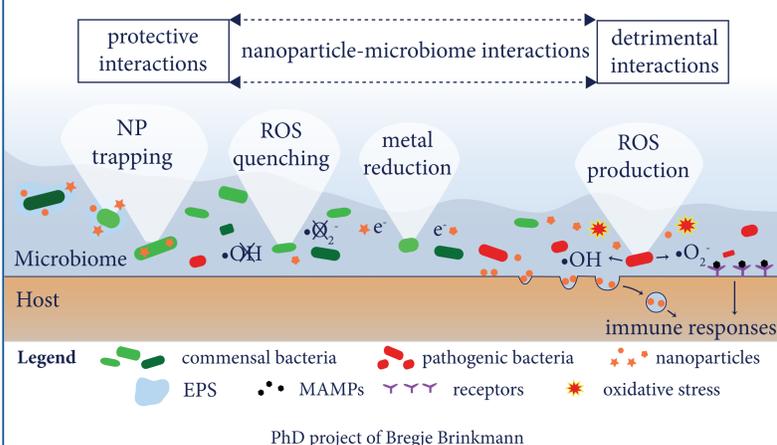
Fate

Environmental variables can alter ENM fate and bioavailability in ecosystems

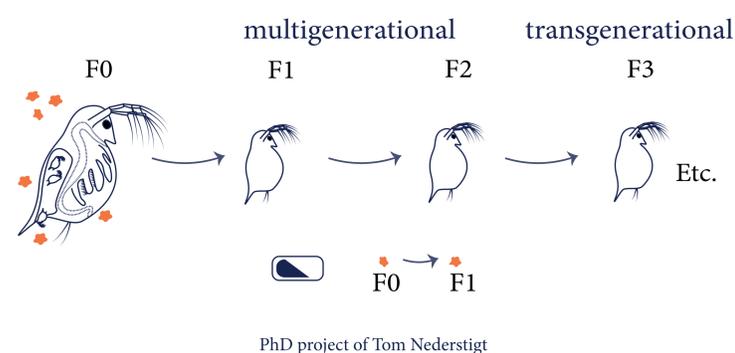


Effects

Microbiome and host interactions may impact ENM toxicity in daphnids and zebrafish embryos



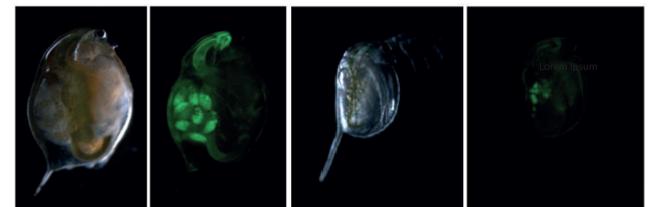
ENM exposure may result in intergenerational effects on fitness related endpoints of aquatic invertebrates



Uptake & Biodistribution

Ad- and absorption of ENMs can occur following aqueous exposure and can result in reduced fitness

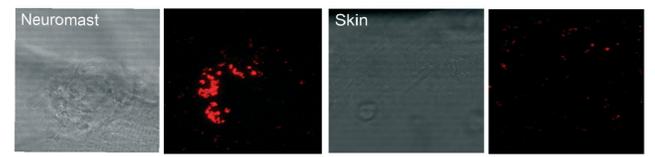
Sorption of polystyrene ENMs to daphnid neonates in the broodpouch (left), with transfer to lipid droplets (right):



Sorption of polystyrene ENMs to the zebrafish gastrointestinal tract (left) and eyes (right):

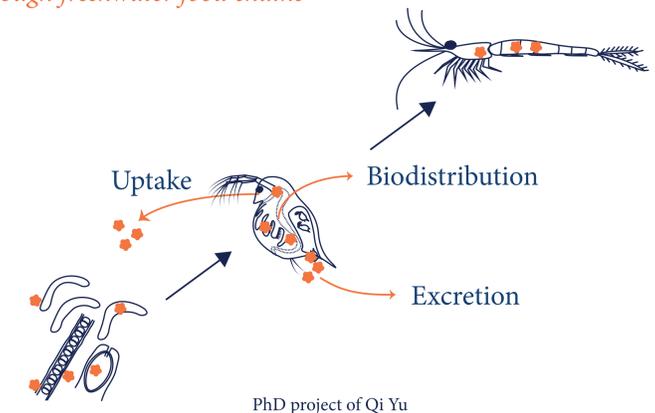


Sorption of polystyrene ENMs to zebrafish neuromasts (left) and skin (right):

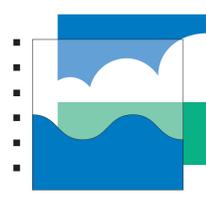


Transfer

Trophic transfer of ENMs may result in propagation of effects through freshwater food chains



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PATROLS
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