Biophysical Interactions at the Bio-nano Interface: Relevance for Aquatic Nanotoxicology

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The intrinsic characteristics of the nanomaterials imply a multi-variable complexity which affects their toxicological potential. Issues gaining increased attention are the toxicological characterization of nanomaterials in relation to the "bio-nano interface" and how physicochemical properties can play an important role in determining bioactivity and toxicity. The present session will be devoted to the study of biophysical interactions concerning nanomaterials with a special focus (but not limited) on aquatic organisms. Including any level of organization: from food webs to subcellular levels. This session includes description, analysis and methodological improvements concerning the following issues:

1. Physicochemistry of biophysical interactions nanomaterial-organism: Physicochemical state of nanomaterials (size, aggregation, morphology, surface charge, reactivity, adsorption of organic/inorganic materials, dissolution etc.) influence/control bioactivity (including toxicity) and their mechanism of action. In the other hand, living organisms can alter physicochemical status of nanomaterials. Basic works and method improvement to get insight into the colloidal aspects of the test systems are welcome.
2. Direct effect of nanomaterials on cellular envelopes: Including in-vitro and in-vivo studies on organisms and/ or model systems: cells, membranes, lipids, proteins, etc. Special focus is posed on microorganisms (bacteria, algae, fungi, protists, etc) and microinvertebrates.
3. Mechanism of action of nanomaterials and internalization: Including direct and indirect effects: Internalization vs dissolution-mediated toxicity; ROS, physical damage, shading, agglomeration, etc. Occurrence and mechanisms of internalization of nanomaterials. Subcellular localization and intracellular responses/alterations.
4. Numerical/mathematical modelization/simulation of biophysical interactions of nanomaterials with biological elements: Consisting in the colloidal level and its equilibrium forces, biophysical interfaces such as envelope-particle interactions, biomacromolecules-particles interactions, dissolution and ion adsorption kinetics, internalization kinetics and intracellular fluxes. Simulation models predicting the physicochemical and toxicological behavior of nanomaterials.

Keywords: Biophysical interactions, colloidal stability, surface attachment, internalization, aquatic organisms

SESSION TYPE: Platform, Poster Spotlight and Poster

ADVISORY GROUP: Nanotechnology Advisory Group (Global)