

## **Marine Nanotoxicology in the U.S.: The University of California Center for Environmental Implications of Nanotechnology (UC CEIN).**

### **G.N. Cherr**

*Departments of Environmental Toxicology and Nutrition, University of California Davis Bodega Marine Laboratory, Bodega Bay, California 94923 USA*

[gcherr@ucdavis.edu](mailto:gcherr@ucdavis.edu)

The University of California Center for Environmental Implications of Nanotechnology (UC CEIN; [1]) was established with funding from the US National Science Foundation and the US Environmental Protection Agency with the mission to study the impact of nanotechnology on the environment, including the identification of hazard and exposure scenarios that take into consideration the novel physicochemical properties of engineered nanomaterials (ENMs). The UC CEIN has made great progress in assembling a multidisciplinary team to develop the scientific underpinnings, research, knowledge, education and outreach that is required for assessing the safety of nanotechnology in the environment. The approach includes high-throughput/content screening approaches to develop structure–activity relationships that can be used to predict the impact of ENMs on organisms in freshwater, marine, and terrestrial environments. Marine studies include species of phytoplankton as primary producers and copepods and mussels as primary consumers linking photosynthesis as well as ENM transfer to higher trophic levels. The effect of ENMs on embryo development is also a focus of the Center [2, 3]. A powerful approach being used to model ENM impact in marine organisms is Dynamic Energy Budget (DEB) theory [4]. DEB theory focuses on the individual organism, with differential equations describing the rates at which an organism assimilates and utilizes energy and materials from food for maintenance, growth, reproduction, and development. The UC CEIN’s marine ecotoxicology efforts link ENM chemical properties, exposure, and biochemical responses of injury with the ecological and physical processes that ultimately regulate ecosystem-level impacts and ecosystem services.

#### References:

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