

## **Environmental Cytotoxicity of Nanoparticles: Differentiating "Nanoparticulate" from "Molecular Scale" Effects (CBET 0966496)**

Terri A. Camesano, Kellie Waterman, Kathleen Wang, Thomas Finelli, Houssam Lazkhani, Andrew Carey, Christina Bailey, Yan Yan, Theresa Logan, and Michelle Ly

Worcester Polytechnic Institute

Worcester, MA 01609 USA

It has been difficult to build a common understanding of how nanoparticles affect biological cells because there are several classes of nanomaterials that must be tested with a variety of biological cells or models, and there are no established dose levels and exposure times. One of the biggest challenges is in disentangling cytotoxic consequences originating solely from the nanoparticulate effects from those originating from molecular scale effects, and identifying appropriate metrics to represent the nanoparticulate effects. Our work focuses on the mechanism of membrane destabilization. We hypothesize that the interactions of nanoparticles less than 22 nm in size with a biological cell will result in membrane destabilization, and that cell membrane damage is a consequence of the nanoparticulate nature of the material only. Further, in the natural environment, nanoparticles will come into contact with organic matter that can bind to and interact with the nanoparticles. We also characterize the role of organic matter in modulating nanoparticle-cell membrane interactions.