The challenges of *in vitro* toxicity testing when using nanomaterials. Presenter*, Collaborators and Affiliation: Susan J. Braunhut, Ph.D.*, Department of Biological Sciences, Joel Therrien, Ph.D, Electrical and Computer Engineering, Dhimiter Bello, Work Environment and Kenneth A. Marx, Ph.D. Chemistry, Center for High-rate Nanomanufacturing, University of Massachusetts Lowell 01854.
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Toxicity testing could be significantly improved in consistency and relevance if study designs considered four major problems inherent to nanomaterial studies. First, we know that chemical composition alone is inadequate to predict nanomaterial toxicity. Thus to compare data from different research groups we need to agree on key reportable attributes when characterizing nanomaterials in individual studies. As a minimum: size distribution, surface activity and hydrophobicity, aspect ratio, coatings, and transition metal content of nanomaterials play major roles in determining toxicity. Second, we know that nanomaterials interfere with key reporter reagents used in conventional toxicity assays. We must ensure the integrity of assays when testing nanomaterials or run the risk of unintentionally underestimating their toxicity. Third, in nanomanufacturing settings, the exposure scenario is likely to be low dose cumulative effects, yet few toxicity assays are performed using repeat dosing evaluations. Single time points, and single dosing methods of testing do not model the most relevant exposure scenarios. And lastly, few methods provide mechanistic information about how the nanomaterial proves toxic to cells. A new label free toxicity assay to perform side-by-side comparisons of human cells representing different cell types of the lung and real time dynamic exposure testing will be discussed.

Presenter Biography Highlights: (limited to 3-5 bullets)

- **Education and Training:** Ph.D.- Columbia University, Postdoctoral Fellowships and Assistant Professor, Harvard Medical School.
- **Current Position Title:** Full Professor (tenured) - Dept. of Biological Sciences, University of Massachusetts.
- Faculty Member of Center for High-rate Nanomanufacturing at the University of Massachusetts-Lowell, in collaboration with Northeastern University. Role- co-PI on EHS supplemental grant to the CHN.