

## **NDnano Undergraduate Research Fellowship (NURF) 2015 Project Summary**

1. Student name: Joshua Dempsey
2. Faculty mentor name: Kathleen Eggleston
3. Project title: Biocomplexity and uncertainty: Science, technology, and ethics in the real-world case of metal nanoparticles in heavy commercial use
4. Briefly describe any new skills you acquired during your summer research: I understand more fully the connection between the classroom and the laboratory—particularly as it relates to ethics education and its implications in professional practice.
5. Briefly share a practical application/end use of your research: Inform and educate scientists and engineers on the ethical, legal, and societal impacts of their research.

Begin two-paragraph project summary here (~ one type-written page) to describe problem and project goal and your activities / results:

This NSF-sponsored project (Award 1338682) broadens graduate-level education of scientists and engineers with relevant macro level ethical issues. An original, nanotechnology-based hypothetical case-study was created for a workshop format. A case-study approach was selected based on evidence of pedagogical efficacy with respect to enhanced empathy for others, critical thinking, and problem-solving skills in real-world situations. Through the developed case, participants are offered an active learning experience through role play. To address specific learning objectives, all are presented with multiple ethical dilemmas and are exposed to a range of pertinent topics: public education, risk assessment, the precautionary principle, stakeholder theory, life cycle assessment, occupational health hazards, and professional responsibilities.

The three-hour workshop was held at ND for four cohorts of graduate students in the Colleges of Science and Engineering. During the proceedings, they were randomly assigned to play one of the scenario's seven societal stakeholders involved in decision-making related to the potential establishment of a nanosilver food-packaging company in their economically struggling Indiana town. Students were given different academic readings, journalistic articles, or reports specifically selected for each character. After a reading period, students took part in a mock town hall meeting in which they discussed risks, benefits, and ethical dilemmas related to the hypothetical case. Afterwards, students took part in out-of-character discussion about the role play experience, also sharing their thoughts and questions about macro-scale decision-making and science policy.

Students finished by completing an assessment in which they gave both quantitative and qualitative feedback affirming the efficacy of the workshop.

Publications (papers/posters/presentations): Presentation title: “Ethics Education of Scientists and Engineers: Efficacy of role-play in ethics education”