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My doctoral thesis research deals with the short-term chronic toxicity of photocatalytic nanoparticles to algae. Nanotechnology is becoming an active pursuit of many technical fields including aerospace, information science, engineering and medicine. In as much as the great potential exists for nanotechnology in the next industrial revolution, many have expressed equally great unease about this emerging technology. Mechanisms controlling nanotechnology are unclear. Especially, there is a lack of studies on the eco-toxicity of manufactured nanoparticles. Since algae are one of the most important primary producers in the aquatic system, any adverse effect on algae may be transferred to the higher consumers, such as protozoa and fish. My research will be among the very first studies to investigate the general eco-toxicity of nanoparticles to algae and the natural algal community. Results of my research will provide information on the adverse effects of nanoparticles on the aquatic ecosystem. Specifically, I will attempt to answer the following questions: What are the important properties of nanoparticles affecting the growth and survival of algae? What are the synergistic or anti-synergistic effects of nanoparticles? What are the dose-response characteristics of nanoparticles on algae? In this research, I will obtain information including the EC₅₀, IC₂₅, and IC₅₀ values of various nanophotocatalysts using *Selenastrum capricornutum* as the target organism. The synergistic and antagonistic effects of nanoparticles will also be examined by copper toxicity to green algae. Additionally I will also assess the response of the natural algal community to nanoparticles.

I would like to learn more about the soil environment. To this end, I will take graduate courses in soil chemistry to strengthen my knowledge in the kinetic behavior of chemical substances in soils and to better prepare myself for future research undertakings on the effects of nanoparticles on the soil environment. The transport and adsorption characteristics of nanoparticles in the natural environment might affect the functions of soils and the health of terrestrial plants. Overall, my goal is to understand the mechanism of eco-toxicity of nanoparticles and to assist policy makers with the establishment of emission standards of nanoparticles in both the aquatic and terrestrial environment.