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Characterization of the Uptake of Quantum Dots by Algae¹ PRIYANKA BHATTACHARYA, SIJIE LIN, Department of Physics and Astronomy, Clemson University, XIAOQIAN SUN, Department of Mathematical Sciences, Clemson University, DAVID BRUNE, Department of Agricultural and Biological Engineering, Clemson University, PU-CHUN KE, Department of Physics and Astronomy, Clemson University — The exposure of living systems to nanoparticles is inevitable due to a dramatic increase in their release into the environment, the most likely pathways being through inhalation, ingestion and skin uptake. The extremely small size of the nanoparticles may facilitate their tissue and cellular uptake by plants and animals, resulting in either positive (drug delivery, antioxidation) or negative (toxicity, cellular dysfunction) effects. Here we report the effects of quantum dots uptake by algae, the single-celled plant species and major food sources for aquatic organisms. In our studies, the presence of quantum dots in algal cells was detected using fluorescence microscopy and electron microscopy. Using spectrophotometry we found a supralinear increase of the uptake with the concentration of quantum dots, with a saturation of the uptake occurring beyond a concentration of 15 mg/mL. Using a bicarbonate indicator we further evaluated the effects of quantum dots uptake on algal photosynthesis and respiration. Such study facilitates our understanding of the environmental impact of nanomaterials.

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