Effect of CeO2 NPs of varying Ce3+ and Ce4+ content on Chlamydomonas reinhardtii under high light stress

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Cerium oxide (CeO_2) nanoparticles (NPs) are well documented to have reactive oxygen species (ROS) scavenging properties. The potential of CeO_2 NPs to scavenge different types of ROS depends on the content of Ce^{3+} and Ce^{4+} [1]. The present study was designed to study the effect of CeO_2 NPs with varying ratio of Ce^{3+} and Ce^{4+} content under high light stress in *Chlamydomonas reinhardtii*. CeO_2 NPs of high and low Ce^{4+}/Ce^{3+} content were synthesized and characterized using Transmission electron microscope (TEM), Scanning electron microscope (SEM) and X-ray diffraction (XRD). The high light induced decline in Fv/Fm (quantum yield of PS II activity) as well as the Chl *a* fluorescence transient of Chlamydomonas was unaffected by both types of CeO_2 NPs. Similar to high light, no effect of either CeO_2 NPs was noted on photosynthetic efficiency of Chlamydomonas under low light. Viability of cells also showed a similar trend. The effect of CeO_2 NPs on Chlamydomonas morphology, as well as interaction between the two was investigated through SEM. The ROS status of cells was evaluated by studying formation of protein radicals using immuno spin trapping technique. The findings of the present study will contribute to a better understanding of effect of nanoparticles on algae and other microbes in aquatic environment and call for environment assessment.

References

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