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Algononics: Integrating nanodots to enhance algal biofuels development

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Algal systems have the potential to alter the landscape of biofuels by enabling the direct capture of the sun and its conversion to valuable biofuels and other co-products. However, there are a number of bottlenecks that limit algal capabilities and have slowed the development and large scale application of microalgae. One of these is their limited light capture bandwidth that can be restrictive and is based on natural photosynthetic capture mechanism. The improvements in light capture with microalgae has potential to get the best of life sciences capability in conversion of light to chemical entities. The capabilities of nanomaterials devices to capture the light available across a wider spectrum is emerging field. To study the impact of enhancing light capture in microalgae was studied by supplementing Chlamydomonas reinhardtii cc503 with Green Graphene Quantum Dots (GGQD). Intake of GGQDs within the microalgae was determined by TEM. Biological compatibility was observed by non-toxic nature of GGQDs. There were not any morphological or chemical changes except for photo-quenching of GGQDs. Despite of photo-quenching cells showed growth and increase in lipid production. Furthermore, investigation was done for lipid and Fatty Acid Methyl Ester (FAME) upsurge and we found that increase in concentration of H2O2 might have caused the enrichment of lipids and FAME. The results indicate specific relation between GGQDs intake and impact on electron gain or loss for florescence quenching activity whereas improving bio-compounds production.

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