A step towards commercialization of biohydrogen photoproduction by green microalgae

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Abstract:

Hydrogen gas as a unique energy carrier and the cleanest burning fuel, is widely known to be future fuel. Unlike current electrochemical and chemical methods of H2 production, which are neither commercially scalable nor environmentally friendly, microalgal H2 photoproduction has the potential of being a non CO2-emitter and affordable method. However extreme sensitivity of hydrogenase enzyme to photosynthetic O2 naturally prevents large-scale H2 production upon illumination. Although a two-phase su lfur de ciency method has been established to deal with this incompatibility, its time and cost demanding, so that this model lacks commercial maturity. Despite much effort has been made so far, no proper economic alternative for the sulfur deprivation model, with higher or even same productivity and sustainability, has been presented. Herein we propose a simple and viable alternative, through introducing a chemical O2 scavenger system, called oxysorb, to algal cultures.

Oxysorb, in non-cytotoxic concentrations (including 50 or 100 mM sodium ascorbate and 5 ppm cupric sulfate) for CC124 as well as pgr5 cultures of Chlamydomonas reinhardtii (containing 30 mg/ml chlorophyll) showed a fast, safe and persisted O2 removal capacity. Thereby oxysorb initiated H2 production, with no needs to sulfur deficiency, sustaining for more than ten days. H2 production obtained with oxysorb-containing cultures was up to 5.5 times higher than sulfur-deprived ones. This higher H2 productivity in the oxysorb approach was achieved due to anoxia establishment with no ROS production and without impacting PSII activity.

Biography:

Fatemeh Khosravitabar has completed his PhD at the age of 33 years from Ferdowsi University of Mashhad,

Mashhad, Iran. She was a research visitor in University of Münster, Germany, for one year (2017-2018). She is currently invited to Uppsala university of Sweden to work on "Hydrogen project" as Postdoc job. She has published 4 papers in reputed journals.

Recent Publications:

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