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Photofuel - Biocatalytic solar fuels for sustainable mobility in Europe

Deliverable D3.11

Performance of biocatalysts outdoors in 120L PBR-scale. Supporting for decision on achievement of M4

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Publishable Summary

Contamination of 1-butanol cultures at pilot scale have been impossible to avoid and the suspicion remains that some contaminants (e.g. bacteria and fungi) are able to metabolize the fuel product. Thus, a new butanol *Synechocystis* sp. PCC6803 strain was engineered by WP2 partners from University of Uppsala. This strain is capable of assimilating phosphite as single source of phosphorous. Assuming that most of the contaminants use only phosphate as source of phosphorous, this strategy could allow butanol accumulation to proceed to levels similar to the ones obtained at lab scale.

The cultivation of new *Synechocystis* sp. PCC6803 strain was carried out in Unilayer horizontal tubular photobioreactor (UHT-PBR) using continuous operation mode and a cultivation medium containing only phosphite as source of phosphorous. Maximum butanol concentration achieved was higher than in previous assays and culture stability was also improved. However, contaminations were eventually able to proliferate, probably due to the capacity of some contaminants to oxidize phosphite to phosphate.

16S meta-sequencing of culture contaminants was developed by partners from University of Bielefeld in order to understand which bacterial genera are present.

Table of contents