

PHOTOSYNTHETIC POLYHYDROXYBUTYRATE PRODUCTION IN CYANOBACTERIA

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Poly- β -hydroxybutyrate (PHB) production from CO₂ has the potential to reduce the production cost of this biodegradable polyesters, and also to make the material more sustainable compared to utilization of sugar feedstocks. In our present studies we have introduced a cyanobacterial strain, *Synechocystis* sp. PCC 6714 as PHB producer and potentially interesting candidate strain for process optimization. Under controlled defined conditions of a photobioreactor the *Synechocystis* sp. PCC 6714 can accumulate up to 18 % dry cell weight PHB under nutrient limitation from CO₂. We aim on developing a process for the production of PHB utilizing CO₂ and sunlight as carbon and energy sources. The process would make sensibility both from economical as well as ecological point of view when a sufficiently high productivity can be obtained. To this end our main focus is cyanobacterial strain improvement using bioprocess optimization tools and direct evolution approach. We avoid genetic engineering in order to enable future possibilities of outdoor open-pond cultivations. Using direct evolution approach we have been successfully able to enhance the PHB productivity by 2 fold from CO₂. Our results add reliability and sound basis to the field and indicate the potential of the strain for further developments towards productivity in industrial scale.