conferenceseries.com
JOINT EVENT ON
5th International Conference on Bioplastics
and
6th World Congress on Biopolymers
September 07-09, 2017 | Paris, France

Maximilian Lackner

Lackner Ventures & Consulting GmbH, Austria

Sustainable PHB production from CO_2 and sunlight using Cyanobacteria

Problem Statement: The use of conventional plastics has become a huge environmental concern and is a growing concern, leading to resource depletion and littering (e.g. microplastics pollution of the sea). Polyhydroxybutyrate (PHB) is formed as energy storage compound by several microorganisms. It has thermoplastic properties and can be a replacement for PP. PHB is fully degradable, also in the marine environment. Today, PHB is synthesized by heterotrophic bacteria using sugar fermentation. The relatively high costs of raw materials and continuous oxygen supply for the processing make PHAs expensive in comparison to other petroleum-derived plastics.

Methodology & Theory: The alternative is to use certain oxygenic Cyanobacteria as cell factory. Cyanobacteria can store PHB under nutrient (P, N) limitation from renewable and sustainable resources sunlight and CO_2 and due to their minimal nutrient requirement are the most promising host systems for PHB production. However the growth rate and the PHB yield stay low. There exists no general method to increase PHB yield in cyanobacteria. This work aims at making cyanobacteria competitive by optimization of growth conditions and by strain selection.

Findings: We screen for wild type strains which can naturally accumulate PHB. During our systematic screening we have discovered a *Cyanobacterium* sp. strain which naturally accumulates a high PHB content under N and P limitations in comparison to other existing strains. The improvement of the strain is possible using process engineering and natural mutations.

Significance: Our project can develop an economically superior bioprocess to enhance biomass growth and PHB productivity and prove feasibility to use CO_2 for production of biodegradable plastics.

Figure 1: Features and advantages of using cyanobacteria as cell factory for PHB production.

Biography

Dr. Maximilian Lackner earned his PhD in 2003 and his habilitation in 2009 from Vienna University of Technology. He has held several senior leadership positions in the polymer industry in Austria and China. Dr. Lackner has founded 5 companies, amongst them one for antimicrobial polymers and one in the area of bioplastics, Lackner Ventures & Consulting GmbH. This company collaborates with JinHui Zhaolong, one of the largest PBAT manufacturers. The research interests of Dr. Lackner include PHA and PBAT. Lackner Ventures & Consulting GmbH runs a research project to produce PHB from CO_2 and sunlight using cyanobacteria. Dr. Lackner has authored more than 100 scientific articles. He teaches materials science at the University of Applied Sciences FH Technikum Wien.

maximilian.lackner@technikum-wien.at

Notes: