Cyanobacteria can manufacture biocatalysts for the industry

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Using photosynthetically active microorganisms, researchers at the Ruhr-Universität Bochum (RUB) have succeeded in manufacturing several biocatalysts suitable for industrial application: a crucial step towards sustainable chemical processes, according to Dr Marc Nowaczyk from the Chair for Plant Biochemistry and Jun.-Prof Dr Robert Kourist, Junior Research Group Microbial Biochemistry.

Sustainable manufacture of enzymes for the industry

Seeing as our planet's fossil resources are limited, researchers are looking for new methods for the production of certain substances, which are not dependent on mineral oil. Photoautotrophic organisms, which gain their energy from light, could be a key to success. The preparation of enzymes allows industrial applications as detergents and for the manufacture of food The only source materials that organisms such as cyanobacteria require for enzyme synthesis are light, water, nutrient salts and CO2. Complex carbon sources such as sugar are not needed, making the approach a sustainable and renewable alternative to the use of agricultural products for cultivation. The researchers from RUB are attempting to develop such "green cell factories".

Feasibility study successful: cyanobacteria compatible with enzyme production

Using cyanobacteria, the researchers from Bochum manufactured

enzymes which, in turn, can be used for producing valuable pharmaceutical substances. For this purpose, they planted genes for enzyme synthesis into the microorganisms. "A particularly important observation was that cell components of cyanobacteria do not interfere with the catalytic activity," Robert Kourist sums up the results of the study. "Using photosynthesis for the production of industrial enzymes from carbon dioxide and water is a novel and environmentally friendly approach."

Process generates pure products

Many catalytic processes result in not only the desired product, but also in a number of by-products, which have to be painstakingly filtered out. Chemical reactions often generate two substances whose chemical structures behave like image and mirror image, so called enantiomers. Using the cyanobacterial, the Bochum researchers have succeeded in generating primarily one structure – an important requirement for pharmaceutical application. They published the results in the journal *Microbial Cell Factories*.

Technology requires higher productivity

However, a wide future application of the "green cell factory" concept requires an improved efficiency. To this end, faster-growing cyanobacteria are required that do not need costly freshwater for growth. "Several cyanobacterial strains have an outstanding potential for this purpose," says Marc Nowaczyk. The team from Bochum is already looking for ways to optimise the "cell factories"; more specifically: the researchers are striving to improve photosynthetic electron transport.

More information: "Photosynthetic production of enantioselective biocatalysts," *Microbial Cell Factories*, DOI:

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