

## Objective:

EMiBEx is a cooperative research project funded by the Investitionsbank of the state Saxony Anhalt between the Anhalt University of Applied Sciences, Fraunhofer Center for Chemical-Biotechnological Processes (CBP) and the Max-Planck Institute for Dynamics of Complex Technical Systems Magdeburg (MPI). The objective of this project is the development of an industrial process for the recovery of phycobilins and fucoxanthin from microalgae biomass (microalgae and cyanobacteria) for human and animal nutrition. To obtain higher productivities, a mixotrophic process in high volume photobioreactors is projected. The benefits of photosynthetic product accumulation can be combined with the higher biomass productivity of heterotrophic cultivation through organic carbon source addition like glycerol.

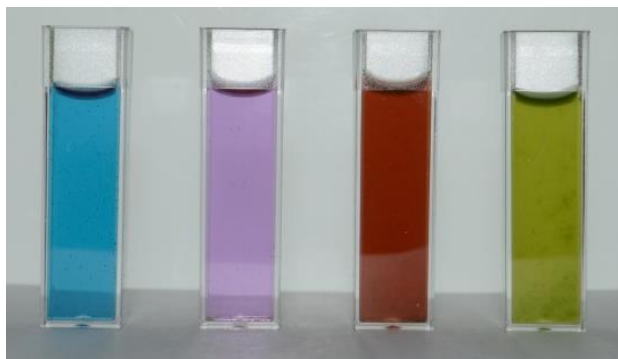
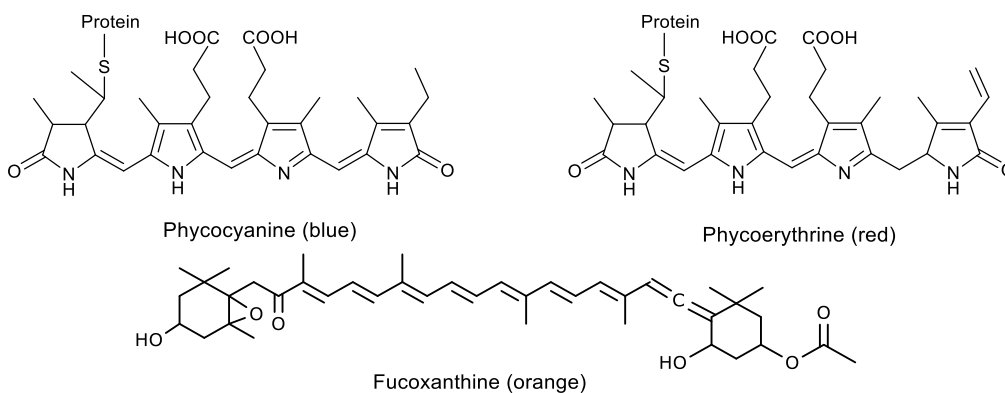
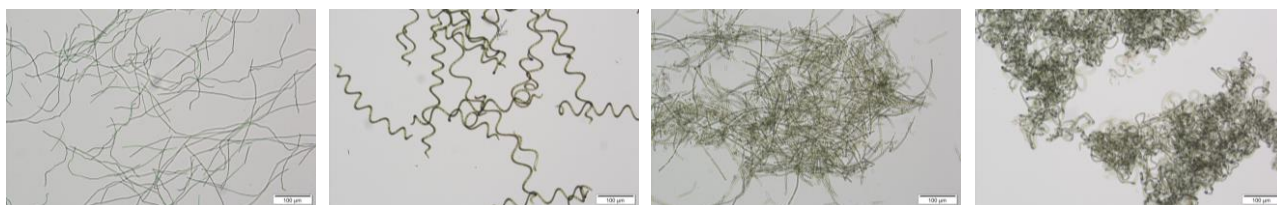


Figure 1: Biological colorants from microalgae.





**Figure 2:** Cultivation in photobioreactors at CBP (left) and at the Anhalt University of Applied Sciences (right).

## Background

Colorants from natural sources have higher consumer acceptance than synthetic ones. The demand for biotechnological produced algae-based dyes is increasing.

Therefore, some dyes such as phycobilins, which can only be produced by microalgae (Cyanophyta/Rhodophyta) are at current research focus. These pigments absorb light of wavelengths between 500 to 650 nm, filling the "green gap" of the major light-harvesting pigment, the chlorophyll. For that reason, the algae are able to collect light in deeper zones of the water or in the shadow of other organisms.

As a result of health protection (anti-inflammatory, anticarcinogen) and the intensive coloring properties, phycobiliproteins were used increasingly for food, cosmetics, and pharmaceuticals as blue (phycocyanin) and red (phycoerythrin) pigments. At the industrial scale, phycocyanin is produced from *Spirulina* and is the only blue nature-based colorant for food applications, permitted by the FDA. Phycocyanin has the potential to replace the synthetic dye brilliant blue as an economic, ecologically worthwhile, and sustainable alternative. Fucoxanthin is a carotenoid, which is not commercialized yet. However, it is already used as a component for nutraceuticals. It indicated weight-reducing characteristics, where especially the amount of belly fat can be lowered through the activation of thermogenin, an uncoupling protein of the mitochondria in brown adipose tissue.

## Project Partner



MAX-PLANCK-INSTITUT  
FÜR DYNAMIK KOMPLEXER  
TECHNISCHER SYSTEME  
MAGDEBURG

## Funding

HIER INVESTIERT EUROPA  
IN DIE ZUKUNFT UNSERES LANDES.  
[www.europa.sachsen-anhalt.de](http://www.europa.sachsen-anhalt.de)



EUROPAISCHE UNION  
EFRE  
Europäischer Fonds für  
regionale Entwicklung

