

Cyanobacteria, the most “green” candidates for biocatalysis

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Cyanobacteria are, quite literally, the most “green” candidates for microbial biocatalysts. These bacteria offer a truly sustainable production system by using water, carbon dioxide and sunlight as their source of energy, thus eliminating any additional feedstock. With our interest on redox-enzymes as catalysts, their ability to obtain their energy through photosynthesis is giving cyanobacteria unique advantages. (i) Most importantly, it is a source of energy which can be used to drive reactions, mostly through generation of high energy cofactors, such as NADPH, FADH and ATP [1]. (ii) Further, the photosynthetic water oxidation feeds the reaction directly with oxygen, which helps overcoming the challenge of sufficient oxygen availability [2]. (iii) In addition, they promise great potential in the production of bioactive compounds as they possess a highly pronounced natural secondary metabolism [3].

Due to this great potential we aim to establish an expression platform for cyanobacteria at the TU Wien. By using modular and up to date cloning methods, we test and validate different expression systems. Based on these experiences, we express artificial mini-pathways and optimize their yields by balancing their individual components. By analyzing the effect of different promoters and expression systems we aim to develop a general strategy that can be used for future pathway expression in cyanobacteria.

[1] S Böhmer, et al., *Catalysts*, **2017**, 7, 240, 1-8

[2] A. Hoschek, et al., *Angew. Chem. Int. Ed.* **2017**, 56, 15146-15149

[3] E. Dittmann, et al., *Trends Microbiol.*, **2015**, 23, 642-652