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## LACTIC ACID PRODUCTION IN THE SYNTHETIC AUTOTROPH KOMAGATAELLA PHAFFII

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**Key Words:** Komagataella Phaffii, Lactic acid, CO<sub>2</sub> assimilation, Calvin cycle

These guidelines have been prepared in the format that should be used for the abstract submission. Authors The methylotrophic yeast *Komagataella phaffii* was recently converted to a synthetic autotroph by the integration of the Calvin Benson Bassham cycle. The key step here is the fixation of one molecule CO<sub>2</sub> by the enzyme RuBisCO. We could already prove that this strain could grow using CO<sub>2</sub> as a carbon source. The next step was to test the ability of this strain to produce organic acids.

We chose lactic acid as a product of choice. It is a hydroxycarboxylic acid used in food, pharmaceutical and chemical industry. Furthermore, it is the precursor of the biodegradable polymer poly-lactic acid (PLA). Lactic acid can easily be produced in *Komagataella phaffii* by integration of a lactate dehydrogenase gene.

In this work we assessed the lactic acid production in the autotrophic strains using CO<sub>2</sub> as carbon source and the LDH gene under the control of the AOX1 promoter. This strain was able to produce up to 150 mg L<sup>-1</sup> in approximately 200 hours of cultivation time. Titters were further improved up to 300 mg L<sup>-1</sup> by the deletion of the CYB2 gene. Additionally, we compared the lactic acid consumption kinetics of the CYB2 knock-out strain compared to its parental strain.

With this work we were able to show that lactic acid can be produced under autotrophic conditions. We were able to further improve the titters by the knock-out of CYB2 which reduced the ability to consume the produced lactic acid.