Moorella thermoacetica, a workhorse creating value from various gaseous substrates

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*Moorella thermoacetica*, a workhorse creating value from various gaseous substrates

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Abstract:
The fermentation of waste gas streams to produce high value compounds is an attractive alternative to traditional biomass hydrolysate fermentation. Industrial waste gases as well as carbon- and energy-rich syngas obtained from gasification of organic-residues can serve as substrate for acetogenic bacteria, but are left unused to date.

*Moorella thermoacetica* is the model acetogenic bacterium and an ideal production organism for gas fermentation processes. Its ability to grow at elevated temperatures of 60°C allows recovery of chemical compounds that have a low boiling point (such as acetone) from the vapor phase. However, production of higher value compounds using *Moorella* requires a better understanding of its metabolism, as well as reliable tools that enable genetic modification.

In the pursuit for making *M. thermoacetica* into an industrially relevant production strain, we studied various relevant aspects: Assessing the cost-effectiveness of acetone production utilizing *M. thermoacetica* as production host, analyzing the response to different substrates by looking at variation in the expression profile (RNA-seq). Technology enabling reliable genetic engineering is very limited, and we have focused on overcoming this challenge through development of selection systems, and improving the transformation.

The gained expertise on cell-level and on process scale will help to make the former model organism an industrially relevant organism for converting waste gas streams into valuable compounds.