EXPLOITABLE FOREGROUND

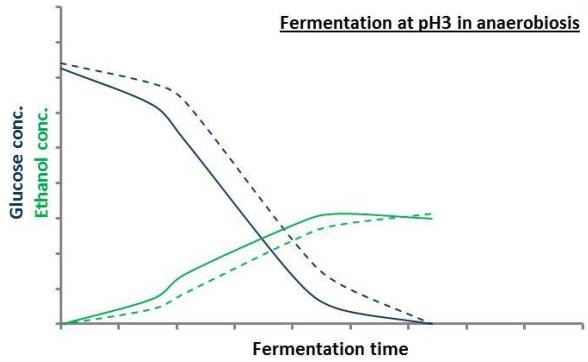
Overexpression of the S. cerevisiae gene MCR1 in cell factory(ies)

Explanation and Purpose

The majority of the rDNA engineering processes, besides the challenges encountered during the research and development phase, fail during the scale-up phase. Indeed, in an industrial process, the (micro-) organism used as a mean of production, is exposed to several stresses that can lead to lower production, lower productivity and lower yield of the product. Studying how to improve the cell factory robustness as well as a deep understanding of its innate potentiality can help in overcoming this challenging bottleneck.

One way to obtain and/or improve strain robustness is the manipulation of the antioxidant capacity of the cell, since many stressors agents have as a consequence the generation and accumulation of reactive species, mainly oxygen species (ROS).

*ScMCR*1 (encoding for a mitochondrial NADH-cytochrome b(5) reductase) demonstrated higher resistance to stresses such as oxidative stress when overexpressed in *S. cerevisiae* cells; these cells performed better in terms of productivity when used for a simulation in defined medium of a process for ethanol production.



Exploitation Strategy

The described strain manipulation could be of interest whenever a cell factory can be limited in production and productivity because of process constraints.

IPR Measures

Depending on the results from the pilot experiments (see below), a patent disclosure could be developed.

Further Research

The *ScMCR*1 overexpression was tested on laboratory engineered strain and in condition similar to a process for ethanol production but in minimal defined medium. Further researches are necessary *(i)* to obtain stable integrated expression cassettes both in laboratory and industrial strain and *(ii)* to confirm the obtained results during a simulated SSF and SHF process on pretreated lignocellulosic material (pilot experiment).

Impact of Exploitation

According to experimental data collected, *ScMCR*1 overexpression can increase strain robustness and this can translate in an advantage in growth/minimization of lag phase in case of limiting or detrimental conditions such as oxidative or related stress. Said robustness has also a positive effect in terms of productivity, as registered for ethanol production in bioreactor batch experiments.

Novel Microbes and Enzymes for 2nd Generation Bioethanol Production

NEMO for bioethanol

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SEVENTH FRAMEWORK PROGRAMME

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