ENGINEERING OF YEAST CELL FACTORIES FOR THE PRODUCTION OF ADVANCED BIOFUELS FROM LIGNOCELLULOSE

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Introduction. Development of novel bioprocesses for production of liquid transportation fuels from biomass requires efficient cell factories that can ensure conversion of the sugars in the biomass to biofuels. Yeast is currently used for 1. generation bioethanol production, i.e. production of ethanol from sugar cane, corn or wheat, and most 2. generation bioethanol initiatives, i.e. production of ethanol from biomass, are also based on yeast as a cell factory. This microorganism is therefore also the preferred cell factory for the production of advanced biofuels that can be used as drop-in fuels in gasoline, diesel and jet fuels. We are working on engineering the metabolism of yeast such that it can produce drop-in fuels like butanols, fatty acyl ethyl esters and alkanes directly by fermentation. The hereby developed yeast cell factories can be used directly for up-grading existing bioethanol production plants to produce more valuable liquid transportation fuels. Engineering of the yeast cell factory is accompanied by engineering calculations on the requirements for yield, titer and productivities in order to be able to produce these drop-in fuels in a cost competitive fashion. Furthermore, we have also performed overall process calculations to evaluate the contribution to mitigation of Green-House Gasses upon production and use of such advanced biofuels. In the presentation there will be given an overview of the engineering strategies applied together with a presentation of the requirements for developing industrial processes.

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