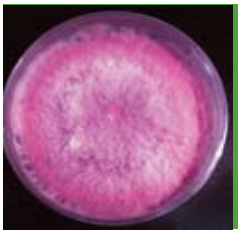
ACCELERATING THE COMMERCIALIZATION OF SECOND GENERATION BIOFUELS

Second generation lignocellulosic biofuels have the potential of contributing to a sustainable and secure European energy supply for the transport sector. European research and industry is presently among the forerunners in developing lignocellulosic bioethanol. In spite of developments during the last decade, some key technical and economical challenges still remain. One of the major targets for decreasing the production costs of lignocellulosic ethanol includes designing of more efficient enzymes and fermenting organisms tailored for efficient conversion of various European raw materials. These common aims are addressed in three projects funded by the EC 7th FWP during 2008-2012. These three projects (HYPE, DISCO and NEMO) will have a major contribution to European technology development for accelerating the commercialization of 2nd generation bioethanol.

In the HYPE project, a combined approach is used to develop a novel integrated concept for hydrolysis and fermentation of lignocellulosic feedstocks. The improved conversion is based on efficient pretreatment, high dry matter liquefaction and hydrolysis, as well as fermentation of all carbohydrates. The approach of the project, based on consolidated bioprocessing, is expected to significantly improve the overall process economy through a reduced process time, improved enzyme efficiency and high yield of all carbohydrates. The technical development within HYPE is closely integrated with pilot-scale testing at an advanced level, thus securing commercially feasible technologies.

The aim of the DISCO project is to develop more efficient and therefore more cost-effective cellulases and hemicellulases for the hydrolysis of pre-treated lignocellulosic biomass. This will be achieved through the discovery of novel enzymes with high catalytic and synergistic activity and low affinity on lignin. The project also focuses on the elucidation of underlying enzymatic hydrolysis mechanisms. Furthermore, the project seeks to demonstrate the proof of concept with the cellulolytic enzymes in a pilot scale using the most relevant European feedstocks.

The NEMO project will develop new high performance enzymes and robust yeast strains, and demonstrate their validity in currently most relevant process concepts. Thermostable enzymes and novel mesophilic enzymes that can be produced economically in large amounts can be used to improve various process concepts. These enzymes will decrease hydrolysis times and the required enzyme loading. Yeasts are important ethanol producing organisms and the project focuses in development of process tolerant strains which can efficiently coferment hexose and pentose sugars of the lignocellulosic hydrolysates.



More information:

HYPE High efficiency consolidated bioprocess technology for lignocellulose ethanol, Grant no. 213139, http://www.helsinki.fi/hype

DISCO Targeted discovery of novel cellulases and hemicellulases and their reaction mechanisms for hydrolysis of lignocellulosic biomass, Grant no. 211863, http://www.disco-project.eu

NEMO Novel high performance enzymes and micro-organisms for conversion of lignocellulosic biomass to bioethanol, Grant no. 222699, http://nemo.vtt.fi