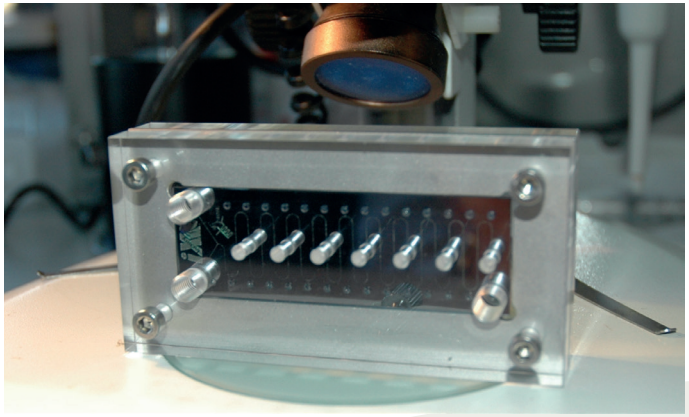
BIOINTENSE is a single stage knowledge based bio economy (KBBE) collaborative project which started on the 1st of August 2012. It is EC-funded through the 7th Framework Cooperation Programme that has the strategic objective of supporting research activities to gain or consolidate leadership in key scientific and technology areas and to encourage international competitiveness whilst promoting research that supports EU policies.

The consortium is led by Professor John M. Woodley from the PROCESS group at the Department of Chemical and Biochemical Engineering at the Technical University of Denmark (DTU). The manager is Associate Professor Ulrich Krühne.

The main objectives in BIOINTENSE are to increase biocatalyst productivity and process intensity. This will result in economically feasible processes by integration and intensification and also shorten the development times by developing optimized tools and protocols that can be widely applicable in industry. More than this, the lack of fundamental understanding on the interactions between reaction, biocatalyst and process characteristics will be addressed to minimize the uncertainties with respect to the cost of future biocatalytic processes. BIOINTENSE will also increase understanding about the factors contributing to the total cost and environmental impact.



Mastering Bioprocess integration and intensification across scales
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Partners:

Danmarks Tekniske Universitet (DTU, DK),
Technische Universität Graz (GUT, AUT)), Univerza Ljubljani (UL, SLO),
Universiteit Gent (UGENT, BE),
The University of Manchester (UMAN, GB), Lunds Universitet (ULUND, SWE),
DSM Innovative Synthesis BV (DSM, NL), Vlaamse Instelling voor Technologisch Onderzoek N.V. (VITO, BE),
iX-Factory (iX-factory, GE),
Microfluidic Chip Shop GmbH (ChipShop,GE),
Luxcel Biosciences Ltd. (Luxcel, IRL),
Lentikat´s a.s. (Lentikats, CZ),
C-LECTA GmbH (C-LECTA, GE) and Sigma Aldrich (SIGMA-ALDRICH, CH).

www.biointense.nu

Technical University of Denmark

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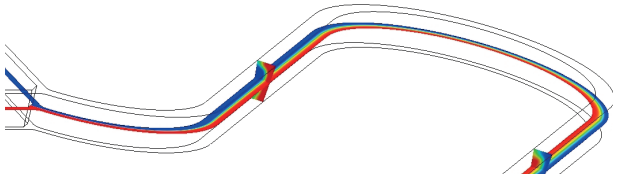
Mastering Bioprocess Integration and Intensification Across Scales

BIOINTENSE

SEVENTH FRAMEWORK PROGRAMME

Main Work Packages

WP1 Microfabrication
WP2 In Situ Product Removal
WP3 Monitoring and Control
WP4 Scale up & Numbering Up
WP5 Fermentation development & production
WP6 Multiobjective biocatalyst screening



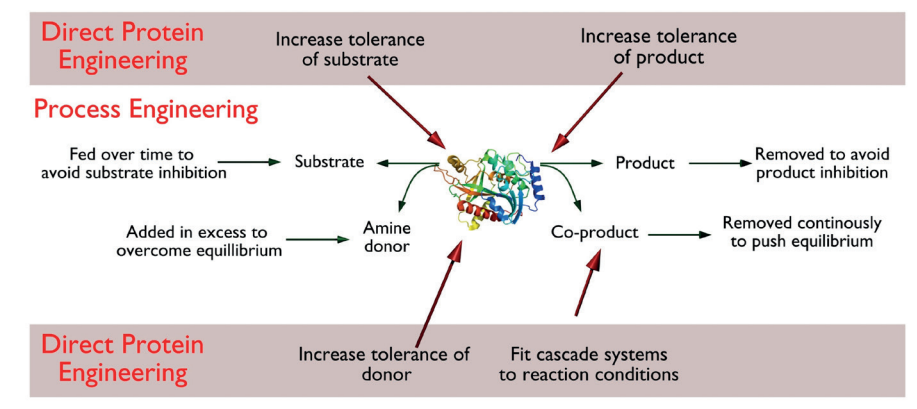
WP7 Stability, stabilization and immobilization
WP8 Economic and environmental evaluation
WP9 Process modeling & design of experiments
WP10 Management
WP11 Dissemination

Main Objectives

The increasing interest in biocatalytic processes means there is a clear need for a new systematic development paradigm which encompasses both protein engineering as well as process engineering.

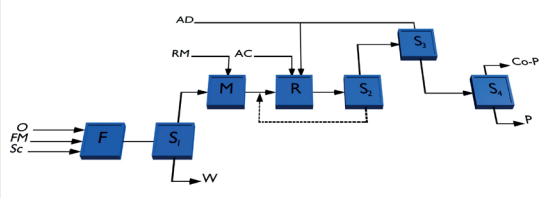
This project argues that through the use of a new microfluidic platform data can be collected more rapidly and integrated.

Furthermore process modeling can provide the basis for validating a reduced number of potential processes.



Advantages: The miniaturized platform should use a smaller reagent inventory and make better use of precious biocatalysts. The project will use ω-transaminase based synthesis of chiral amines as a test-bed for assessing the viability of such high throughput biocatalytic process development.

This figure presents a generalized process flowsheet for transaminase-catalyzed reactions.



Different unit operations: fermenter (F), mixer (M), reactor (R) and separators (S1-4) can be arranged in the miniaturized platform and automatically screened. This gives the opportunity to rapidly screen for alternative reaction conditions (including reactant concentrations, product concentrations, fermentation media, pH conditions etc.).

Intelligent coupling of experimental results with deterministic models gives the benefit to exclude beforehand process options with low performance probability. Hence this models will be used for the effective design of experiments.

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