UMR 792 - Engineering of Biological Systems and Processes (LISBP)

SUPERVISORY BODIES

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CNRS
INSA Toulouse

UNIT MANAGER

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LOCATION

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LISBP's work has applications in the health, biotechnology, water and environment, agri-food and agro-industries, eco-industries and chemicals sectors. They are organized around 4 axes: Biocatalysis; Microbial physiology and metabolism; Microbial systems and bioprocesses; Mixed transfer-interface; Hybrid separation-oxidations-processes for the environment.

AXIS 1: Biocatalysis
A pivotal discipline in white biotechnology, biocatalysis accelerates chemical reactions and the production of products of interest through the use of enzymes. Within LISBP, the BioCatalysis research axis is dedicated to the identification, design and implementation of optimized and efficient biocatalysts.
Targeting active enzymes on agro-resources, research aims to optimize the use of agro-resources to produce 2nd generation biofuels and related products of interest: bio-refinery concept.

Axis 2: Physiology and Metabolism Microbials
"The microorganism: from its functional knowledge and mastery to its exploitation as a cell factory" describes in a global way the scientific strategy of this axis, which is part of the post-genomic era and proposes an approach starting from the genome of prokaryotic and eukaryotic organisms and focusing on transcriptomics and metabolomics to applications in industrial biotechnology.

Axis 3: Microbial and Bioprocess Systems
This axis focuses its activity on the study of macroscopic microbial physiology and microbial dynamics within a reactor. The work is essentially based on the concept of renewable raw material, trying to exploit existing resources to optimize processes, produce alternative materials to the conventional carbon economy, treat and recover waste. This includes, through the choice of topics of interest, conducting "reasoned research" that takes into account economic, political and societal realities and can respond to the new or evolving needs of society and the planet.
Depending on the subject and the team, this is pre-competitive research involving white biotechnologies, but also red, green or black biotechnologies (bioterrorism), which is upstream of the product or process development but of a nature within 10 or 20 years, to give a competitive advantage to the industrial partner, particularly in the chemical or bioenergy markets. There may also be discussion of yellow biotechnology, particularly on applications for bio-purification of water and effluents, and the provision of more immediate technological solutions for curative systems such as purification plants.

Axis 4: Transfer-Interface-Mixing
At the heart of the work carried out, there are three key approaches and phases:
• The study of elementary mechanisms within model systems,
• The notion of scale change: from the microscopic level to the macroscopic reactor,
• Validation on a pilot scale, prefiguration of the industrial reactor or treatment plant.

Axis 5 : Separation-Oxidation-Processes Hybrids for the Environment
The SOPHYE axis is based on an approach based on :
• Separation processes (membranes, adsorption, chromatography, crystallization)

• Oxidation processes (oxidation and advanced oxidation)
• Hybrid processes (membrane bioreactors, membrane distillation, adsorption/membrane, adsorption/ozonation and adsorption/bioregeneration, coagulation/hydrocyclonation)
• Environmental assessment and eco-design of processes

Unit website : http://www.lisbp.fr/fr/index.html

DOCTORAL SCHOOL(S)

SEVAB

DS 458 - Ecological, veterinary, agronomic and bioengineering sciences

Website : http://www.sevab.ups-tlse.fr

Co-accredited institutions : Institut National Polytechnique de Toulouse, Université Paul Sabatier (Toulouse), INSA Toulouse

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