



POLISH NATIONAL AGENCY
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PROGRAMME

<p>name of the unit:</p> <p>DEPARTMENT OF BIOPROCESS ENGINEERING</p> <p>Faculty of Process and Environmental Engineering Lodz University of Technology</p>		<p>symbol:</p> <p>K-92</p> <p>http://www.wipos.p.lodz.pl</p>
<p>head of the unit:</p> <p>Prof. Stanisław Ledakowicz, PhD, DSc</p>	<p>potential promoters:</p> <p>Prof. Stanisław Ledakowicz, PhD, DSc Prof. Marcin Bizukojć, PhD, DSc Prof. Liliana Krzystek, PhD, DSc Prof. Elwira Tomczak, PhD, DSc Paweł Głuszcz, PhD, DSc Katarzyna Paździor, PhD, DSc Marek Solecki, PhD, DSc</p>	<p>contact person:</p> <p>Prof. Marcin Bizukojć, PhD, DSc</p> <p>tel: 42-631-39-72</p> <p>marcin.bizukojc@p.lodz.pl</p>
<p>scope of activities:</p> <ul style="list-style-type: none"> - Improvement of biosynthesis processes to minimize troublesome waste, - Application of ion exchange to separate and purify organic acids, - Study on the process of filtration and microfiltration of biomass, - Bioprocesses integrated with unconventional methods of down-stream processing (foam fractionation, two-phase water extraction), - Kinetics, modeling and optimization of bioprocesses, - Processes of pyrolysis and gasification of biomass, - Biomass disintegration processes, - Membrane processes, - Biodegradation of industrial wastewater, - Integration of biodegradation and advanced oxidation processes for industrial wastewater treatment, - Toxicity analysis and identification of transformation products, - Reclamation and inertisation of old municipal waste landfills, - Water and wastewater toxicity tests, - Thermochemical utilization of municipal waste and sewage sludge, - Removal of mercury from soils by biosorption and bioleaching, - Production of methane and hydrogen in the process of anaerobic digestion. 		  
<p>present activities:</p> <ul style="list-style-type: none"> - Photobiosynthesis with the use of microalgae in biorefineries, - Cultivation of thermophilic cyanobacteria to obtain valuable substances, - Biosynthesis of secondary metabolites in co-cultures of filamentous fungi and actinomycetes, - Biodegradation of plastics from renewable raw materials, - Morphological engineering of filamentous microorganisms (filamentous fungi and actinomycetes). 		
<p>Future activities:</p> <ul style="list-style-type: none"> - Biosynthesis of secondary metabolites in cocultures of filamentous fungi and algae, - Hydrothermal liquefaction of biomass integrated with hydrogen biosynthesis in dark fermentation - Extraction of the proteins in the aqueous three-phase liquid-liquid-solid systems. 		
<p>Publications/patents, awards, projects:</p> <ul style="list-style-type: none"> • Anteck A., Klepacz-Smółka A., Szela R., Pietrzyk D., Ledakowicz S. (2022). Comparison of three methods for thermostable C-phycoyanin separation and purification. Chemical Engineering and Processing-Process Intensification, 171, 108563. 		



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- Ścigaczewska A., Boruta T., Bizukojć M. (2021). Quantitative morphological analysis of filamentous microorganisms in cocultures and monocultures: *Aspergillus terreus* and *Streptomyces rimosus* Warfare in Bioreactors. *Biomolecules*, 11(11), 1740.
- Li X., Liang Y., Li K., Jin P., Tang J., Klepacz-Smółka A., Ledakowicz S., Daroch M. (2021). Effects of low temperature, nitrogen starvation and their combination on the photosynthesis and metabolites of *Thermosynechococcus* E542: A comparison study. *Plants*, 10(10), 2101.

Currently realized international projects:

1. Research centre for low-carbon energy technologies, 2019-2022, Czech Technical University in Prague, CZE,
2. Developing & implementation sustainability-based solutions for bio-based plastic production & use to preserve land& sea environmental quality in Europe, EU project Horizon 2020.

Keywords:

actinomycetes, biogas, biomass, bioreactor, co-culture, disintegration, extraction, filtration fungi, gasification, hydrogen, image analysis, photobioreactor, kinetics, membranes, microalgae, pyrolysis, separation

List of internship proposal in this research team:

- Application of morphological engineering in the cultivation of actinomycetes,
- Down-stream processing of selected proteins,
- Up-stream and down-stream processing of thermophilic cyanobacteria.