

Development of biocatalysts and biocatalytic systems

Keywords: biocatalyst, enzymes, gene engineering, expression systems, screening systems, immobilization, metagenomics, biotransformations, bioconversion



Vilnius
University



Research group activities

The need to replace the chemical methodologies with green and renewable alternatives by utilizing biocatalysts and the designed biocatalytic technologies is one of the global challenges.

Our team focuses on the discovery and engineering of biocatalysts with properties for potential industrial application and development of efficient biocatalytic routes for producing the high-added value products from bio-based raw materials or industrial by-products.

Mainly we work on development of biocatalytic systems employing oxidative, lipolytic, hydrolytic, proteolytic enzymes. For the development of gene expression systems we use bacterial

and yeast species (*K.lactis*, *K.marxianus*, *S.cerevisiae*). The latter enables cultivation of microorganism on the medium with industrial waste products (whey, formaldehyde, etc.). We also have a long lasting experience in development of immobilized biocatalytic systems (carrier and carrier-free).

Among our many capabilities we possess our own metagenomic DNA libraries originated from sludge, soil and polluted water samples.



Proposal

We have skills and experience, possess tools and capacities to develop biocatalytic solutions for specific needs. Please contact us if you need:

- screening for enzymes (environmental samples, enzyme and strain collections, metagenomic and expression libraries, development of screening systems, etc.);
- development of biocatalyst (gene engineering, development of analytical systems, protein purification, development of expression systems, etc.);
- application of biocatalyst (immobilization, recycling, proof of principal, activity/selectivity, stability, reaction media, improved efficiency of bioconversions, quality analysis of products obtained by biocatalysis, etc.);
- application of Green Chemistry principles in technologies and processes.



Meet our team

Lead researcher

Dr. Inga Matijošytė

Scientists

Rimantas Šiekštelė

Aušra Veteikytė

Milda Šulcienė



Research outcomes

Most important publications

- **R. Gruškienė, V. Kairys, I. Matijošytė.** CLEA-based immobilization of methylotropic yeast alcohol oxidase: influence on storage stability and reaction efficiency. *Org. Process Res. Dev.*, 2015, 19 (12): 2025-2033.
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- **M. Šulcienė, A. Karalius, I. Matijošytė.** Chemo-enzymatic route for the production of biopolyol from rapeseed oil. *Curr. Org. Chem.* 2014, 18: 3037-3043
- **E. Kleinaitė, V. Jaška, B. Tvaska, I. Matijošytė.** A cleaner approach for biolubricant production using biodiesel as a starting material. *J. Clean Prod.*, 2014, 75:40-44
- **Veteikytė, M. Aštrauskaitė, R. Gruškienė, R. Tekorienė, I. Matijošytė.** Secondary alcohol oxidase activity identified in genus of *Pseudomonas* isolated from the oil polluted soil. *Biocat. Agricult. Biotechnol.*, 2013, 2 (2): 89-95
- **Matijošytė, I.W.C.E. Arends, S. de Vries, R.A. Sheldon.** Preparation and use of cross-linked aggregates (CLEAs) of laccases. *J. Mol. Catal. B: Enzym.*, 2010 (62): 142-148, (2010-2011 TOP 25 cited article of the journal)
- **A. Veteikytė, R. Šiekštelė, B. Tvaska, I. Matijošytė.** Sequential application of waste whey as a medium component for *Kluyveromyces lactis* cultivation and a co-feeder for lipase immobilization by CLEA method. *Applied Microbiology and Biotechnology.* 2017, 101:3617-3626.



Resources

Collaboration with industry partners:

We have a history of successful collaboration with industry partners by solving industrial problems and applying biocatalytic processes.



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