Development of biocatalysts and

biocatalytic systems

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

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 routs 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, lypolytic, 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.

• R. Šiekštelė, A. Veteikytė, B. Tvaska, I. Matijošytė. Yeast Kluyveromyces lactis as host for expression of the bacterial lipase: cloning and adaptation of the new lipase gene from Serratia sp. J. Ind. Microbiol. Biotechnol., 2015, 42: 1309-1317

• 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. Mati jošytė. 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. Mati jošytė. Sequential application of waste whey as a medium component for Klyuveromyces 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.

Contacts

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