



BIOTECHNOLOGY *for* A CIRCULAR BIOECONOMY

28 - 29 March 2023 | AFOB-EFB Virtual Conference

Programme and abstract book

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**Biotechnology for a circular
bioeconomy:
carbon capture, waste recycling
and mitigation of global warming**

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Programme

All times in CET

28 March 2023

Session 1: Carbon capture for energy, products and proteins

Session Chairs: **Jeff Cole**, the EFB President, **Takeshi Omasa**, the AFOB President, and **Penjit Srinophakun**, Kasetsart University, Thailand

9:00-9:05 Introduction by **Jeff Cole**, the EFB President

9:05-9:30 Keynote lecture: Biological carbon capture and economic feasibility, **Sang-Jun Sim**, Korea University, Korea

9:30-9:40 Invited talk: Potential algal research and its applications, **Wanida Pan-Utai**, Department of Applied Microbiology, Institute of Food Research and Product Development, Kasetsart University, Thailand

9:40-9:50 Invited talk: Bioelectrochemical methane production from CO₂, **Sabine Spieß**, K1-MET, Austria

9:50-10:00 Invited talk: Carbon dioxide (CO₂) biofixation using microalgae, **Shaza Eva Mohamad**, Universiti Teknologi Malaysia

10:00-10:25 Keynote lecture: From methanol to protein – yeast platforms for sustainable food production, **Diethard Mattanovich**, University of Natural Resources and Life Sciences, Austria

10:25-10:30 Questions and discussion

11:00 - 11:25 Keynote lecture: The carbon revolution: scaling circularity to replace fossil oil using the power of biology, **Michael Köpke**, LanzaTech, USA

11:25 - 11:40 Flash poster presentations part 1

Session 2: From waste and wastewater to valuable products

Session Chairs: **Jeff Cole**, the EFB President, **Takeshi Omasa**, the AFOB President and **Penjit Srinophakun**, Kasetsart University, Thailand

11:50-11:55 Introduction by **Takeshi Omasa**, the AFOB President

11:55 -12:20 Keynote lecture: Simultaneous enzymatic saccharification and comminution (SESC) for biofuel generation from wood lignocellulose, **Kazuhide Kimbara**, Shizuoka University, Japan

12:20-12:30 The EFB Journal *New Biotechnology*, **Dan Cheng**, Elsevier

12:30-12:40 Invited talk: Carbon dots from bioresources and biomass waste for bio-related applications, **Chularat Sakdaronnarong**, Mahidol University, Thailand

12:40-12:50 Invited talk: Product development opportunities based on green biomass from arable and horticultural crops, **Tarek Alshaal**, University of Debrecen, Hungary

12:50-13:00 Short talk: Mesophilic and thermophilic microbial consortia from a local biogas plant secrete highly stable xylanases, **Luca Bombardi**, University of Verona, Italy

13:00-13:10 Short talk: Preliminary characterization of the plastic-degrading potential of environmental consortia, **Andrea Salini**, Università degli studi di Verona, Italy

13:10-13:15 Questions and discussion

13:20 - 13:30 Flash poster presentations part 2

13:30 – 14:20 Poster session

29 March 2023

Session 3: Biotechnology to mitigate climate change and global warming

Session Chairs: **Stephen Euston**, Heriot-Watt University, UK; **Jitka Frébortová**, Palacký University, Czech Republic; **Ivo Frébort**, Palacký University, Czech Republic

9:00-9:05 Introduction by **Jitka Frébortová**, Palacký University, Czech Republic

9:05-9:30 Keynote lecture: Is it possible to reduce green house gases by biotechnology?, **Jinwon Lee**, C1 Gas Refinery R&D Center, Sogang University, Korea

9:30-9:40 Short talk: Green roofs as a biotechnological tool to urban climate change mitigation, **Ana Mafalda da Cruz Mendes**, FEUP- Faculdade de Engenharia da Universidade do Porto, Portugal

9:40-9:50 Invited talk: Valorization of byproducts and waste from food industry, **Stefano Sforza**, University of Parma, Italy

9:50-10:00 The Bioeconomy Journal, **Stephen Euston**, Heriot-Watt University, UK

10:00-10:25 Keynote lecture: Molecular pharming and plant gene editing, **Goetz Hensel**, Heinrich-Heine-University, Germany

10:25-10:50 Keynote lecture: Plant sciences and integrated bioeconomy: a route to mitigating and adapting to climate and global change, **Ulrich Schurr**, Forschungszentrum Jülich, Germany

10:50-11:00 Short talk: Development of a lactic acid-producing *S. cerevisiae* strain, **Arne Peetermans**, KU Leuven, Belgium

11:00-11:05 Questions and discussion

11:10-11:35 Flash poster presentations part 3

Session 4: Towards a circular bioeconomy: progress and bottlenecks

Session Chairs: **Stephen Euston**, Heriot-Watt University, UK; **Jitka Frébortová**, Palacký University, Czech Republic; **Ivo Frébort**, Palacký University, Czech Republic

11:35-11:40 Introduction by **Stephen Euston**, Heriot-Watt University, UK

11:40-12:05 Keynote lecture: From synthetic biology to carbon net zero, **I-Son Grace Ng**, National Cheng Kung University, Taiwan

12:05-12:15 Invited talk: The planned reform of EU GMO legislation and its influence on market viability of products of the New Genomic Techniques, **Tomasz Zimny**, Institute of Law Studies of the Polish Academy of Sciences, Poland

12:15-12:40 Keynote lecture: Towards a European circular bioeconomy: progress and new opportunities, **Fabio Fava**, University of Bologna, Italy

12:40-13:00 Invited talk: Holistic policy for carbon capture and utilisation (CCU) through biomanufacturing, **Jim Philp**, OECD

13:00-13:10 Invited talk: Latest microalgae refinery for a circular bioeconomy, **Pau-Loke Show**, Khalifa University, UAE

13:10-13:15 Questions and discussion

List of flash poster presentations

Flash poster presentations part 1

Bioprocessing of sugarcane molasses into gluconic acid by *Aureobasidium pullulans*: effect of oxygen transfer rate in stirred and airlift bioreactors, **Sílvia Fernandes**, Universidade do Minho, Portugal

Clostridium kluyveri vs. *Megasphaera hexanoica*: two chain elongators for caproate production, **Carla Fernández Blanco**, University of A Coruña, Spain

Bacterial candidates for carbon dioxide fixation and photosynthetic production of value-added substances, **André Freches**, NOVA School of Science and Technology, Portugal

Assimilation of hexadecane by *Yarrowia lipolytica* for co-production of microbial lipids and enzymes, **Sílvia Miranda**, University of Minho, Portugal

Flash poster presentations part 2

Rice industry residues potential for curcumin production by engineered *Saccharomyces cerevisiae*, **João Rainha**, Centre of Biological Engineering, University of Minho, Portugal

Accumulation of lipids by oleaginous yeast grown on carboxylic acids produced from CO₂ and syngas fermentation, **Raul Robles-Iglesias**, University of La Coruña, Spain

From mushroom waste to specialty sugars: valorisation of chitin-rich waste streams using *E.coli*, **Sofie Snoeck**, Ghent University, Belgium

Flash poster presentations part 3

Removal of clay minerals from aqueous solution using biopolymeric bioflocculants, **Afsheen Aman**, The Karachi Institute of Biotechnology & Genetic Engineering (KIBGE), University of Karachi, Pakistan

Photosynthetic bacterial pigments production during biological sulfide removal by *Chloroflexus aurantiacus* Y-400-fl (DSM 637): influence of the light intensity, **Roxana Angeles Torres**, Institute of sustainable processes, University of Valladolid, Spain

Agro-industrial wastes as alternative substrates for the production of prebiotic with *Zymomonas mobilis*, **Adelaide Braga**, Universidade do Minho, Centro de Engenharia Biológica, Portugal

Lipids production by *Yarrowia lipolytica* from glucose and compounds found in lignocellulosic biomass hydrolysates, **Bruna Dias**, University of Minho, Portugal

Deconstruction of untreated lignocellulose by mesophilic and thermophilic microbial consortia from a local biogas plant, **Salvatore Fusco**, University of Verona, Department of Biotechnology, Italy

High-quality biodiesel production from *Yarrowia lipolytica* NCYC 2904 bio-oil, **Ana S. Pereira**, University of Minho, Portugal

Continuous polyhydroxybutyrate production from biogas in an innovative two-stage bioreactor configuration, **Yadira Rodríguez**, Institute of Sustainable Processes, Spain

GREEN DEAL BIOTECHNOLOGY

6-8 November 2023 Poznań Poland



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Biotechnology

The “Green Deal Biotechnology” will highlight the latest advances in achieving a circular economy in which environmental biotechnology plays a major role.

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- Recovery of resources, including rare resources and novel bio-based value chains
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- Bioelectrochemistry for energy and water recovery
- Wastewater treatment
- Nanotechnology in environmental biotechnology
- Marine biotechnology
- Antibiotics and micropollutants in the environment

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Analysis of PET degrading enzymes by bioinformatic tools

Aleksa Savic¹, Marija Stefanovic², Filip Slovic², Jelena Radosavljevic²

¹ Innovative Centre of the Faculty of Chemistry, Belgrade, Serbia

² University of Belgrade - Faculty of Chemistry, Belgrade, Serbia

PET hydrolases are enzymes that have been shown to act upon PET as a substrate. These enzymes usually adopt an α/β hydrolase fold and are from the classes of esterases, lipases, cutinases, and hydrolases.

Here, we have done sequence alignment by ClustalW of the sequences corresponding to the entries available in the PAZy database (pazy.eu) with the addition of a highly efficient *I. sakaiensis* PETase mutant W159H/S238F and analyzed the results. The aligned sequences included several different well-aligned segments, which were as follows: 18 single-amino acid segments, 13 two-amino acid segments, 10 three-amino-acid segments, 1 four-amino acid segment, 1 six-amino acid segment and 1 eight-amino acid segment. Additionally, at position 238, which is adjacent to a highly conserved His237, the most common amino acids were F, T, S, Y, W, L and G, whereas at position 159, the most common amino acids were W, H, I and L, flanked by a conserved three- and eight-amino acid region. These positions seem to be critical for the improvement of the PET hydrolytic activity based on the comparison of *I. sakaiensis* PETase mutant W159H/S238F and wt enzyme.

Using AlphaFold 2.0 we have predicted the structures of all enzymes available in the database whose structures haven't been previously reported and the presence of the α/β hydrolase motif has been observed. The sequences were also analyzed by SIAS (imed.med.ucm.es).

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