IMPLEMENTATION OF MICROREACTOR TECHNOLOGY IN BIOTECHNOLOGY

5TH INTERNATIONAL CONFERENCE 19-22 MAY · 2019 CAVTAT · CROATIA

CONFERENCE PROGRAMME

Sunday, 19th May 2019

16:30 – 19:00 Registration

19:00 – 19:15 Opening ceremony

19:15 – 20:15 **Opening lecture**
Marrying microfluidics & spectroscopy: Towards ultra-high-throughput information generation
Andrew de Mello, ETH Zürich, Switzerland

Chairs: **Polona Žnidaršič Plazl**, University of Ljubljana, Slovenia
Bruno Zelić, University of Zagreb, Croatia

20:15 Welcome party

Monday, 20th May 2019

8:00 – 9:00 Registration

9:00 – 9:55 **Plenary talk**
Top-down and bottom-up assembly of enzyme cascades – a multiscale approach to compartmentalized biocatalysis
Christof M. Niemeyer, Karlsruhe Institute of Technology, Germany

Chair: **László Poppe,** Budapest University of Technology and Economics, Hungary

Session ENZYMATIC MICROREACTORS

Chairs: **Roland Wohlgemuth**, Łódź University, Poland
Jennifer A. Littlechild, University of Exeter, United Kingdom

10:00 – 10:30 **Keynote lecture**
Sustainable catalysis: Enzyme-mediated synthesis of high value chemicals and pharmaceuticals in flow reactors
Francesca Paradisi, University of Nottingham, United Kingdom

10:30 – 10:50 *Enzyme engineering for additive manufacturing of biocatalytic flow reactors*
Kersten S. Rabe
Karlsruhe Institute of Technology, Germany

10:50 – 11:20 Coffee break

11:20 – 11:40 *Biocatalytic reaction intensification in microstructured reactors with immobilized enzymes*
Juan M. Bolivar, Donya Valikhani, Bernd Nidetzky
Graz University of Technology, Austria

11:40 – 12:00 *Magnetic and imprinted cross-linked enzyme aggregates of rhamnopyranosidase in microbioreactors towards neuroprotective bioactive compounds*
Maria H. Ribeiro, Sara Fonseca, Maria Emilia Rosa, Patricia Lage
University of Lisboa, Portugal

12:00 – 12:20 *Nano-scale enzyme membrane reactors for multienzyme syntheses in mono- and biphasic reaction setups*
Florian Golombek, Ludwig Klermund, Sarah Poschenrieder, Kathrin Castiglione
Friedrich-Alexander-University, Germany

12:20 – 12:40 *Modelling and kinetic parameter estimation of enzymatic biodiesel production in a microreactor*
Ana Jurinjak Tušek, Martin Gojun, Anita Šalić, Bruno Zelić
University of Zagreb, Croatia

12:40 – 13:00 *Photo-enhanced flow biosynthesis of silver nanoparticles*
Thomas Mabey, Domenico Andrea Cristaldi, Peijun He, Collin Sones, Sandra Wilks, Petra Oyston, Karl Lymer, Charles William Keevil, Xunli Zhang
University of Southampton, United Kingdom

13:00 – 14:30 Lunch

Session CELLS WITHIN MICRODEVICES

Chairs: **Bruno Bühler**, Helmholtz-Centre for Environmental Research, Germany
Nicolas Szita, University College London, United Kingdom

14:30 – 15:00 **Keynote lecture**
Single Cell Antibiograms
Piotr Garstecki, Polish Academy of Sciences, Poland

15:00 – 15:20 *On-chip DO control in (anaerobic) microbial single-cell cultivation and analysis*
Dietrich Kohlheyer, **Markus Leygeber**
Forschungszentrum Jülich; RWTH Aachen University, Germany

15:20 – 15:40 *Studying the effect of dissolved oxygen levels on yeast growth in microfluidic droplet array*
Kartik Totlani, Piyush Katakwar, Naomi du Pree, Walter van Gulik, Michiel Kreutzer, Volkert van Steijn
Delft University of Technology, The Netherlands

15:40 – 16:00 *Intensification of mass transfer in a micro-cavity reactor using capillary waves*
Lasse Frey, David Vorländer, Sven Meinen, Detlev Rasch, Andreas Dietzel, Rainer Krull
Technical University Braunschweig, Germany

16:00 – 16:30 Coffee break

16:30 – 16:50 *Mixed-species biofilms for high-cell-density application of* Synechocystis *sp. PCC 6803 in capillary microreactors for continuous cyclohexane oxidation to cyclohexanol*
Rohan Karande, Anna Hoschek, Ingeborg Heuschkel, Andreas Schmid, Bruno Bühler, Katja Bühler
Helmholtz-Centre for Environmental Research, Germany

16:50 – 17:10 *An automated portable mini incubator for cell investigations in passive microfluidic devices*
Pushparani Micheal Raj, Simona Zaccone, Elisabetta Stranieri, Francesco Guzzi, Maria Antonia D'Attimo, Patrizio Candeloro, Maria Laura Coluccio, Elvira Parrotta, Giovanni Cuda, Ulrich Krühne, Enzo Di Fabrizio, Gerardo Perozziello
University of Catanzaro, Italy; Technical University of Denmark, Denmark

17:10 – 17:30 *On-chip incubator for constrained liver spheroids*
Ciprian Iliescu, Fang Yu, Hanry Yu
University of Singapore, Singapore

Session Poster spotlights

Chairs: **Ulrich Krühne,** Technical University of Denmark, Denmark
Rainer Krull, Technical University Braunschweig, Germany

17:30 – 17:35 *Enzyme synthesis of cephalexin in aqueous two-phase systems*
Lucie Vobecká, Linda Tichá, Jakub Tuček, Aleksandra Atanasova, Karel Mařík, Zdeněk Slouka, Pavel Hasal, **Michal Přibyl**
University of Chemistry and Technology Prague, Czech Republic

17:35 – 17:40 *Multi-scale-optimization of a micro-bio-reactor for chiral reduction*
Philip Pietrek, Teresa Burgahn, Kersten S. Rabe, Christof M. Niemeyer, Roland Dittmeyer
Karlsruhe Institute of Technology, Institute for Micro Process Engineering; Karlsruhe Institute of Technology, Institute for Biological Interfaces, Germany

17:40 – 17:45 *Immobilizaton of cells in a microreactor using copolymer hydrogel*
Tadej Menegatti, Polona Žnidaršič Plazl
University of Ljubljana, Slovenia

17:45 – 17:50 *Packed-bed flow reactors and integrated cofactor regeneration system to achieve redox biocatalysis in continous processing*
María Romero-Fernández, Francesca Paradisi
University of Nottingham, United Kingdom

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17:50 – 17:55 *A flow approach to the production of cis-4-(tert-butyl)cyclohexyl from 4-(tert-butyl)cyclohexanone via a two-steps enzymatic synthesis*
Francesca Tentori, Elisabetta Brenna, Michele Crotti, Giuseppe Pedrocchi-Fantoni, Maria Chiara Ghezzi, Davide Tessaro
Polytechnic University of Milan, Italy; Institute of chemistry of molecular recognition, Italy

17:55 – 18:00 *2nd EUROMBR Training course announcement*
Rainer Krull, Technical University Braunschweig, Germany

18:00 – 20:00 **Poster session**

Tuesday, 21st May 2019

9:00 – 9:55 **Plenary talk**
Microfluidic technologies for human disease diagnosis and therapy
Chwee Teck Lim, National University of Singapore, Singapore

Chair: **Takehiko Kitamori**, The University of Tokyo, Japan

Session **ANALYTICAL MICRODEVICES**
Chairs: **Gerardo Perozziello,** University of Magna Graecia, Italy
Torsten Mayr, Graz University of Technology, Austria

10:00 – 10:30 **Keynote lecture**
Single-cell microfluidic technology for studying microbial communities
Huabing Yin, University of Glasgow, United Kingdom

10:30 – 10:50 *Femto-liter cytokine analysis from living single cell by using nanofluidics*
Takehiko Kitamori
University of Tokyo, Japan

10:50 – 11:20 Coffee break

11:20 – 11:40 *Toxicity testing in microfluidic cell culture using integrated optical sensors*
Torsten Mayr, Bernhard Müller, Dominik Rabl, Philipp Sulzer, Manuel Walch, Helene Zirath, Tomas Buryska, Mario Rothbauer, Peter Ertl
Graz University of Technology; kdg opticomp GmbH; Vienna University of Technology, Austria

11:40 – 12:00 *Electrochemical biosensors for* in-situ *monitoring of stress responses in large bioreactors*
Aliyeh Hasanzadeh, Helena Junicke, Krist V. Gernaey
Technical University of Denmark, Denmark

12:00 – 12:20 *Integrated micro-laboratories: Coupling droplet-based microfluidics with electrospray ionization mass spectrometry*
Konstantin Wink, Detlev Belder
Leipzig University, Germany

12:20 – 12:40 *Implementation of droplet microbioreactor technology for ultrahigh-throughput strain development*
Peter Panjan, Isidora Čobanov, Tina Kogej, Gregor Kosec
Acies Bio, Slovenia

12:40 – 13:00 *Fluorescence lifetime-activated droplet sorting (FLADS) in microfluidic chip systems*
Sadat Hasan, Detlev Belder
Leipzig University, Germany

13:00 – 14:00 Lunch

14:00 – 15:00 **Poster session**
15:30 – 19:30 Excursion
20:00 Gala dinner

Wednesday, 22nd May 2019

9:00 – 9:55 **Plenary talk**
A time scale analysis and characteristic times of microscale-based bioreactors
Goran Jovanović, Igor Plazl
Oregon State University, USA; University of Ljubljana, Slovenia

Chair: **John Woodley,** Technical University of Denmark, Denmark

Session **BIOPROCESS INTENSIFICATION AND INTEGRATION**
Chairs: **Goran N. Jovanović,** Oregon State University, USA
Igor Plazl, University of Ljubljana, Slovenia

10:00 – 10:30 **Keynote lecture**
A tool for bioprocess intensification: Tube-in-tube microreactor technology for evaluation of enzyme kinetics
John Woodley, Technical University of Denmark, Denmark

10:30 – 10:50 *Flow-biocatalysis through self-sufficient immobilized multi-enzyme systems*
Ana I. Benítez-Mateos, Martina L. Contente, Susana Velasco-Lozano, Francesca Paradisi, **Fernando López-Gallego**
University of Zaragoza, Spain

10:50 – 11:20 Coffee break

11:20 – 11:40 *Chemo-enzymatic reactions in flow: First coupling of a catalytic Diels-Alder reaction with a transketolase-catalyzed chain elongation in a cascade*
Mariana Santos, Pia Gruber, Brian O'Sullivan, Sarah Müller, Alina Bunescu, Alexandra Romek, Frank Baganz, Marco P. C. Marques, Helen Hailes, Nicolas Szita, Roland Wohlgemuth
University College London, United Kingdom; Sigma-Aldrich, Germany; Sigma-Aldrich, Switzerland; Łódź University of Technology, Poland

11:40 – 12:00 *Flow bioreactors for the preparation of pharmaceutically relevant nucleoside derivatives*
Lucia Tamborini, Francesca Annunziata, Clelia Previtali, Enrica Calleri, Francesca Rinaldi, Marco Terreni, Giovanna Speranza, Andrea Pinto, Daniela Ubiali, Paola Conti
University of Milan, Italy; University of Pavia, Italy

12:00 – 12:20 *Extraction of antibiotics and their precursors in microfluidic contactors with transport enhanced by electric field*
Alexandr Romanov, Zdeněk Slouka, Lucie Vobecká, Michal Přibyl
University of Chemistry and Technology Prague, Czech Republic

12:20 – 12:40 *Scale, modeling and microfluidics*
Ulrich Krühne, Tannaz Tajsolejman, Ines Pereira Rosinha Grundtvig, Susanna Lladó Maldonado, John Woodley, Rainer Krull, Krist V. Gernaey
Technical University of Denmark, Denmark; Technical University of Braunschweig, Germany

12:40 – 13:00 *Lattice Boltzmann Model Validation of a Two-Phase Liquid-Liquid Microseparator*
Filip Strniša, Mark Selan, Tomaž Urbič, Igor Plazl
University of Ljubljana, Slovenia

13:00 – 13:15 Closing ceremony