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MONDAY 2nd OCTOBER

	Room A2	Room A3	Room A4	Room A5	Room B1
09:00 - 10:00 h	OPENING & AWARDS CEREMONY (Main Auditorium)				
10:00 - 11:00 h	PLENARY LECTURE: Ignacio E. Grossmann Department of Chemical Engineering Center for Advanced Process Decision Making. Carnegie Mellon University,Pittsburgh, USA "Evolution of Process Systems Engineering and Future Trends in Research"				
11:00 - 11:30 h	COFFEE - POSTERS				
11:30 - 13:00 h	TOPIC 6.1 Biomass Pretreatment	JE-Process Safety-Education	JE- SPOUTED BED Fundamentals	JE-IPIC-SPIRE session	TOPIC 5.2 Nanocarbons & Nanocomposites
13:00 - 14:30 h	LUNCH				
14:30 - 15:30 h	PLENARY (Main Auditorium) Jackie Y. Ying. Institute of Bioengineering and Nanotechnology, Singapore. "Tackling Global Challenges with the Nanotechnology Toolbox"				
15:30- 16:00 h	COFFEE - POSTERS				
16:00 - 17:30 h	TOPIC 6.1 Enzyme Eng.	JE- Process Safety-Leadership	JE- SPOUTED BED Simulation	JE-IPIC Batch to Continuous 1	TOPIC 5.2 Exp. Strategies Along QbD
17:30 - 19:00 h	TOPIC 6.1 Reactor Design & Eng.1	JE- Process Safety-Management 1	JE- SPOUTED BED Scaling up & Applications	JE-IPIC Teaching/Batch to Continuous 2	TOPIC 5.2 Functionalized Nanofilaments
19:00 h	Cheese& Wine Reception around the Posters				

	ROOM D5 (Cont.)	ROOM D6 (Cont.)	ROOM D7 (Cont.)
16:00 – 17 :30 h	JE-PARMAT Mixing Chairs: Baldyga	TOPIC 2 Heat & Mass Transfer 2 Chair: J. Baldyga y Sorensen	ICOSSE 1-The Transition to Sustainable Living 2 Chair: Jim Petrie, Sophie Duquesne
	SOC-35221 Experimental analysis of solids dissolution in stirred vessels of different sizes by Electrical Resistance Tomography C. Carletti, S. Bikić, A. Paglianti, G. Montante Italy		

	ROOM A2	ROOM A3	ROOM A4
17:30 – 19:00h	TOPIC 6.1 - Reactor Design & Eng. 1 Chairs: P. Jacques, M. Canovas	JE- Process Safety-Management 1 Chair: Trish Kerin	JE-SPOUTED BED Scaling up & Applications Chairs: Heinrich, Olazar
	OC- 40386 Enhanced succinic acid production by Basfia succiniciproducens through integrated fermentation with electrolytic membrane extraction C. Pateraki, S. Andersen, A. Koutinas, K. Rabaey Greece	**KN - 96301 A Journey to Excellence in Process Safety Management** M. Mannan United States of America	**KN – 96731 Pharmaceutical Applications of Spouted Beds: Solid Dosage Forms** L. Freitas Brazil
	OC- 53541 BIOCHEM: A new methodology for designing mixed-culture bioprocesses assisted with bioenergetics models A. Regueira, M. Mauricio-Iglesias, M. Carballa, J. Lema Spain	**OC - 49921 Preserving process safety information as a key asset of the company** R. Camerano Ruiz Colombia	**OC – 42366 Effect of pulsed air flow on hydrodynamics of a slot rectangular spouted bed** M. Parise, Z. Wang, C. Lim, J. Grace Canada
	OC- 34576 Characterization of an innovative fed-batch microplate feeding system D. Keil, B. Dittrich, S. Selzer, J. Büchs Germany	**OC - 50681 Optimising risk operations in large-scale facilities using dynamic risk models** A. Casal, M. Dahlby, K. Giljarhus Spain	**OC – 33146 usage of a spouted bed spray granulation process for fabrication of composite materials** E. Eichner, M. Dosta, S. Heinrich, G. Schneider Germany

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BIOCHEM: A new methodology for designing mixed-culture bioprocesses assisted with bioenergetics models

Alberte REGUEIRA[1], Miguel MAURICIO-IGLESIAS[1], Marta CARBALLA[1], Juan M. LEMA[1]

[1] *Universidade de Santiago de Compostela, Spain*

Mixed culture fermentations (MCFs) are recognised as an inexpensive means to produce high-added-value-products from low-grade biomass

However, developing a new bioprocess based on this technology is a challenging task. Although mixed cultures are advantageous when treating complex substrates in a continuous operation they also pose a fundamental challenge: they are complex and uncharacterized and we are not able to fully understand the mechanisms that control these populations. In consequence, it is difficult to control the operation and to foresee the outcome of the process.

In this context, we present ERA-NET IB project BIOCHEM project aiming at designing a methodology for the development of a novel process using MCFs focusing on two aspects: reaching a high productivity and achieving a high selectivity of the desired product(s).

The optimisation of product selectivity is carried out by a bioenergetics-based model [1] , which can predict the most favoured metabolic routes with the operational conditions It is based on the assumption that in energy-scarce environments, like an anaerobic fermentation, thermodynamic constraints select the products being yield by the microbial consortia. Hence, changing the operational conditions (e.g. pH, temperature or substrate) can shift the process to particular metabolic routes modifying thus the stoichiometry of the fermentation. The increase of productivity is investigated by merging the bioenergetics model with a kinetic-based model (e.g. ADM1, [2]), thereby adapting the operation conditions and substrate composition that maximise the productivity of the desired product(s). The diagram in Figure 1 describes the methodology and the information flow. As a final demonstration of the BIOCHEM methodology, the design of a bioprocess for the production of volatile fatty acids (VFAs) by anaerobic fermentation of food waste is proposed and experimentally validated.

[1] González-Cabaleiro, R., J.M. Lema, and J. Rodríguez, Metabolic Energy-Based Modelling Explains Product Yielding in Anaerobic Mixed Culture Fermentations. PLoS ONE, 2015. 10(5): p. e0126739.

[2] Batstone, D.J., et al., The IWA Anaerobic Digestion Model No 1 (ADM1). Water Sci Technol, 2002. 45(10): p. 65-73.