

5th International Conference on Green Process Engineering (GPE 2016)

An ECI Conference Series Volume 16AG

Mont Tremblant, Canada
19 - 24 June 2016

Editors:

**Franco Berruti
Cedric Briens**

ISBN: 978-1-5108-3251-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2016) by Engineering Conferences International
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact Engineering Conferences International
at the address below.

Engineering Conferences International
32 Broadway, Suite 314
New York, NY 10004
USA

Phone: (212) 514-6760
Fax: (212) 514-6030

info@engconfintl.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Monday, June 20, 2016

- 07:30 - 08:30 Breakfast Buffet
- 08:30 - 08:45 Welcome and Conference Overview
Conference Chairs, ECI Technical Liaison
- INTEGRATED BIOREFINERIES**
- 08:45 - 09:15 **Plenary 1 - Enerkem - Marketable bioproducts and biomaterials from research to commercial manufacture for sustainability, Greenhouse gas emission reductions and a circular economy**
Richard Jewell – Enerkem - Canada
- 09:15 - 09:30 **27 - Extraction of products from algae using green solvents**
Philip Jessop - Queen's University - Canada; Roland Lee, Pascale Champagne - Queen's University - Canada
- 09:30 - 09:45 **102 – Adhesives from biomass pyrolysis**
Dongbing Li - ICFAR, Western University – Canada; Franco Berruti, Cedric Briens – ICFAR, Western University – Canada
- 09:45 - 10:00 **26 - Hydrothermal treatment of bio-oil for the production of biodiesel antioxidants**
Jesus Arauzo - Universidad de Zaragoza - Spain; Noemí Gil-Lalaguna, Ana Bautista, Lucía Botella, Alberto Gonzalo, José Luis Sánchez - Universidad de Zaragoza – Spain
- 10:00 - 10:15 **81 - Pyrolysis of residues from well-established biochemical processes for biomass conversion into liquid fuel**
Devon Barry – ICFAR, Western University – Canada; Cedric Briens, Franco Berruti – ICFAR, Western University – Canada
- 10:15 - 10:45 Coffee break/Networking
- 10:45 - 11:00 **98 – Using the jigged bed reactor to develop activated carbons from biomass residues**
Franco Berruti - ICFAR, Western University – Canada; Franco Berruti, Cedric Briens - ICFAR, Western University – Canada
- 11:00 - 11:15 **85 - Influence of pre-treatment on grass pyrolysis for high value products**
Chiara Barbiero - ICFAR, Western University – Canada; Cedric Briens, Franco Berruti - ICFAR, Western University – Canada
- 11:15 - 11:30 **10 - Selective production of sugars and glycolaldehyde from agricultural biomass using supercritical water as reaction medium**
Celia M. Martínez - University of Valladolid – Spain; Danilo A. Cantero - University of Cornell – USA; Francesc Recasens - Universitat Politècnica de Catalunya – Spain; MJ Cocero - University of Valladolid - Spain
- 11:30 - 11:45 **13 - Process for removal and recovery of phenolic compounds from switchgrass**
Robert Counce - University of Tennessee – USA; Michelle L. Lehmann, Jack S. Watson, Nikki Labbé, Jingming Tao - University of Tennessee – USA
- 11:45 - 12:00 **1 - The integrated forest biorefinery, an example of green engineering**
Jean Paris - Polytechnique Montreal, Canada; Miyuru Kannangara, Mariya Marinova, Michel Perrier - Polytechnique Montreal, Canada

Monday, June 20, 2016 (continued)

- 12:00 - 12:15 **7 - Biomass gasification in a fluidized bed reactor: effect of temperature on properties and oxidative reactivity of chars**)
Mathieu Morin - CNRS LGC Toulouse – France; Sébastien Pécate, Mehrdji Hémati - CNRS LGC Toulouse – France; Olivier Marsan - Centre Inter-universitaire de Recherche et d'Ingénierie des Matériaux - France
- 12:30 – 13:30 Lunch
- 13:30 - 17:30 Networking/*ad hoc* sessions/free time
- 17:30 – 17:45 **93 - Characterization of fluidized bed pyrolysis of sewage sludge by time-resolved pressure measurements**)
Piero Salatino - Università di Napoli Federico II – Italy; Mirco Della Volpe - Università di Napoli Federico II – Italy; Roberto Solimene - Istituto di Ricerche sulla Combustione - Italy
- 17:45 – 18:00 **97 - Two-stage thermochemical valorization of sugar-derived humins**)
Raghavendra Sumbharaju - Energy Research Centre of the Netherlands ECN) – The Netherlands
- 18:00 – 18:15 **99 – Fundamental study and applications to biomass pyrolysis of the mechanically fluidized reactor**)
Valentina Lago: Devon Barry - ICFAR, Western University – Canada; Cedric Briens, Franco Berruti - ICFAR, Western University – Canada
- 18:15 - 18:30 **29 - Performance and emissions of a diesel engine fueled with biodiesel dopen with a renewable antioxidant additive**)
Alberto Gonzalo - Universidad de Zaragoza – Spain; Jorge Arroyo, Francisco Moreno, Mariano Muñoz, Carlos Monné, Ana Bautista, Noemí Gil-Lalaguna, Cristina Dueso, José Luis Sánchez - Universidad de Zaragoza – Spain
- 18:30 – 18:45 **103 - Impact of TGA measurements on activation energy (Ea) determination: case study applied to biomasses by means of isoconversional methods**)
Marco Brighenti - Università' di Trento – Italy, Mauro Grigiana, D. Antolini - Università' di Trento – Italy
- 19:30 – 21:00 Dinner
- 21:00 - 22:30 Poster Session and Social Hour

Tuesday, June 21, 2016

- 07:30 - 08:30 Breakfast Buffet
- 08:30 - 08:45 Announcements
- 08:45 - 09:15 **Plenary 2 - Improving resource efficiency to address climate change by observing Nature**
Jocelyn Doucet and Jamal Chaouki – Ecole Polytechnique, Montréal - Canada
- NOVEL CATALYTIC AND BIO-CATALYTIC PROCESSES II**
- 09:15 - 09:30 **94 - Butanol production by Clostridium acetobutylicum in a series of packed biofilm bed reactors**
Piero Salatino - Università di Napoli Federico II – Italy; Francesca Raganati, Alessandra Procentese, Giuseppe Olivieri, Antonio Marzocchella - Università di Napoli Federico II – Italy; Maria Elena Russo - Istituto di Ricerche sulla Combustione – CNR - Italy
- 09:30 - 09:45 **79 - Steam reforming of pyrolysis oil using nickel-spinel based catalysis**
Jasmin Blanchard - Université de Sherbrooke - Canada; Nicolas Abatzoglou - Université de Sherbrooke - Canada
- 09:45 - 10:00 **89 - TiO₂ – Photocatalysts with doped platinum for hydrogen production via water dissociation**
Hugo de Lasa - Western University - Canada; Benito Serrano Rosales, Alan Ruben Calzada Hernandez - Universidad Autonoma de Zacatecas – Mexico; Jesus Fabricio Guayaquil, Salvador Escobedo Salas - Western University - Canada
- 10:00 - 10:15 **38 - Development of Ni-Co bimetallic catalyst for hydrogen generation via supercritical water gasification of lignin and waste biomass**
Kang; Mohsen Shakouri, Ramin Azargohar, Ajay K. Dalai - University of Saskatchewan – Canada; Hui Wang – University of Saskatchewan – Canada
- 10:15 - 10:45 Coffee break/Networking
- 10:45 - 11:00 **41 - Ammoxidation of acrolein to acrylonitrile over bismuth molybdate catalysts**
Nguyen Thanh-Binh – Laval University – Canada; Serge Kaliaquine – Laval University – Canada; Jean-Luc Dubois – Arkema - France
- 11:00 - 11:15 **14 – Catalytic property of olivine for bio-oil gasification**,
Mohammad Latifi - Ecole Polytechnique de Montreal - Canada; Franco Berruti, Cedric Briens - ICFAR, Western University – Canada
- 11:15 - 11:30 **31 - Heterogeneous catalysis for the extraction of arabinoxylans from wheat bran** &
Nuria Sánchez-Bastardo - University of Valladolid - Spain; María José Cocero, Esther Alonso - University of Valladolid - Spain
- 11:30 - 11:45 **36 - Production of glycerol 1,2-carbonate from glycerol with aid of ionic liquid as catalyst** -
Nor Asrina Sairi - University of Malaya - Malaysia; Zati Ismah Ishak, Yatimah Alias, Rozita Yusoff, Mohamed KheireddineTaieb Aroua - University of Malaya - Malaysia

Tuesday, June 21, 2016 (continued)

- 11:45 – 12:00 **58 - Batch fermentation of D-glucose/cellobiose mixtures by Clostridium Acetobutylicum Atcc 824: Energetic and carbon source regulation** -
Felipe Buendia-Kandia - LRGP-CNRS, Lorraine University, Nancy –France; Emmanuel Rondags, Anthony Dufour, Guillain Mauviel, Emmanuel Guedon - LRGP-CNRS, Lorraine University, Nancy –France
- 12:00 – 12:15 **107 - ABE fermentation from microalgae-derived carbohydrates after lipid extraction**
Kai Gao - Western University – Canada; Lars Rehm - Western University – Canada
- 12:15 – 12:30 **113 - Development and industrial application of novel non-Cr passivity for electrolytic manganese**
Siming Chen - Institute of Process Engineering, CAS, China; Dongping Duan, Qinghai Institute of Salt Lakes, Chinese Academy of Sciences, Xining 810008, Qinghai, China; E Zhou, Key Laboratory of Green Process and Engineering, Institute of Process Engineering, CAS, China; Ting Li - Institute of Process Engineering, CAS – China
- 12:30 – 13:30 Lunch
- 13:30 - 17:30 Networking/*ad hoc* sessions/free time
- SAFETY, RISK MANAGEMENT AND ENVIRONMENTAL PROTECTION**
- 17:30 - 17:45 **11 - Improving EIA and LUP practice in India: challenges and approaches**
Sandip Roy – IIT Bombay – India
- 17:45 – 18:00 **9 - A new CO₂ concentration process integrated into cement plants**
Laboratoire de Génie Chimique (LGC) – France; Mehrdji Hemati - Laboratoire de Génie Chimique (LGC) – France; Michel Gimenez – LafargeHolcim - France
- 18:00 – 18:15 **44 - A comparative study of two processes for indoor VOCs treatment: Biofiltration vs. hybrid system (biological process + adsorption)**
Angela Tatiana Luengas - Université de Pau et des Pays de l'Adour - France; Cécile Hort, Vincent Platel - Université de Pau et des Pays de l'Adour – France; Ana Elias, Astrid Barona - University of the Basque Country - Spain
- 18:15 - 18:30 **3 - Erythromycin degradation by an esterase in enzymatic membrane reactors**
Jose Sanchez-Marcano - Institut Europeen des Membranes - France; Matthias de Cazes, Marie Pierre Belleville, Eddy Petit - Institut Europeen des Membranes – France; Mathias Salomo, Sally Bayer, Rico Czaja - c-LEcta, Germany; Jean De Gunzburg - Da Volterra – France
- 18:30 – 19:00 **24 - SO_x trapping performances of CuO based silica mesoporous adsorbent for desulfurization of industrial flue gas stream**
Sophie DORGE - Université de Haute-Alsace - France; Pierrick Gaudin, Marc Berger, Habiba Nouali, Laure Michelin, Ludovic Josien, Joël Patarin - Université de Poitiers – France; David Habermacher, Jean-François Brillhac - Université de Haute-Alsace – France; Matthieu Vierling - GE Energy – France; Michel Molière - Université de Technologie de Belfort-Montbéliard – France; Emmanuel Fiani – ADEME - France
- 19:00 – 19:15 **104 - Co-combustion of coal and a reengineered feedstock for emissions reduction**
Mohammad Latifi - Ecole Polytechnique de Montreal - Canada, Abdelmajid Rakib, Pierre Sauriol, Jean-Philippe Laviolette, Jamal Chaouki - Ecole Polytechnique de Montreal - Canada

Tuesday, June 21, 2016 (continued)

19:30 - 21:00

Dinner

21:00 - 22:30

Poster Session and Social Hour

Wednesday, June 22, 2016

07:30 - 08:30

Breakfast Buffet

PROCESS INTENSIFICATION

08:30- 08:45

74 - Intensified post-combustion CO₂ capture: Potential of hollow fiber membrane contactors for absorption and stripping steps

David Albarracin Zaidiza – LRGP – France; Bouchra Belaisaoui, Sabine Rode, Denis Roizard, Eric Favre – LRGP – France

08:45 – 09:00

100 – Development of a mobile, 100 kg/h plant for pyrolysis, using a mechanically fluidized reactor

Stefano Tacchino; Dhiraj Kankariya - ICFAR, Western University – Canada; Franco Berruti, Cedric Briens - ICFAR, Western University – Canada

09:00 – 09:15

101 – Integrating batch pyrolysis and fractional condensation (2D MFR) to get high-value products from biomass

Chiara Barbiero - ICFAR, Western University - Canada; Mohammad Hossain, Franco Berruti, Cedric Briens - ICFAR, Western University – Canada; Ian Scott - Agriculture and Agri-Food - Canada

09:15 - 09:30

105 - Microwave assisted pyrolysis of kraft lignin at reduce pressure in a multimode oven

Mattia Bartoli - University of Florence - Italy, Marco Frediani, Luca Rosi, Piero Frediani - University of Florence -Italy

09:30 - 09:45

52 - The potentiality of reactive membranes for post combustion CO₂ capture

Marc Pfister - LRGP (Laboratory of Reaction and Process Engineering) - France

09:45 - 10:00

54 - Polymeric membranes for treatment of produced water on offshore platform

King Wo Li - Institut Europeen des Membranes (IEM) – France; Amira Hanafia, Jean-Pierre Mericq, Catherine Faur, Damien Quemener, Andre Deratani, Denis Bouyer - Institut Europeen des Membranes (IEM) - France

10:00 - 10:15

91 - Ageing of reverse osmosis membranes under gamma irradiation

Emilie Carretier - Aix Marseille University – France; Nicolas Combernoux, Luc Schrive, Véronique Labeled – CEA – France; Yvan Wyart, Philippe Moulin - Aix Marseille University - France

10:15 - 10:45

Coffee break/Networking

10:45 - 11:00

70 - Continuous flow intensification of ortho-lithiation at ambient conditions

Ruili Feng - School of Chemical Engineering and Advanced Materials, Newcastle University - Singapore; Sushil Rajan Ramchandani, Balamurugan Ramalingam, Song Wei Benjamin TAN, Soo Khean TEOH, Paul Sharratt – Institute of Chemical and Engineering Sciences – Singapore; Chuanzhao LI, Kamelia Boodhoo - Newcastle University - Singapore

11:00 - 11:15

40 - Technological breakthrough and innovation in the production of whey powders, with 30 – 40% reduction in energy costs

Pierre Schuck – Inra – France; Anne Dolivet, Serge Méjean, Gaele Tanguy, Romain Jeantet – Inra – France; Daniel Garreau – Commer – France; Corrado Vezzani – Vomm – Italy

Wednesday, June 22, 2016 (continued)

- 11:15 - 11:30 **43 - Bio-oils from microwave assisted pyrolysis of cellulose using a multi-mode batch reactor**
Marco Frediani - University of Florence - Italy; Piero Frediani, Luca Rosi, Mattia Bartoli - University of Florence - Italy
- 11:30 - 11:45 **45 - Dry fractionation of plant material powders using an electrostatic corona separator: a model study**
Claire Mayer - INRA/UMR IATE - France; Andy Cadin, Xavier Rouau - INRA/UMR IATE - France; Sara Messal, Lucian Dascalescou - Institut PPRIME - France
- 11:45 - 12:00 **50 - Integration of nanofiltration in the production of succinic acid from fermentation of lignocellulosic material**
Hélène Roux-de Balmann - University of Toulouse - France; Panwana Khunnonkwao, Sylvain Galier - University of Toulouse – France; Kaemwich Jantama, Sunthorn Kanchanatawee - Suranaree University of Technology
- 12:30 – 13:30 Lunch
- 13:30 – 19:30 Networking/*ad hoc* sessions/free time
- 19:30 – 21:00 Dinner
- 21:00 - 22:30 Poster Session and Social Hour

Thursday, June 23, 2016

07:30 - 08:30 Breakfast Buffet

08:30 - 08:45 Announcements

PROCESS DESIGN AND DEVELOPMENT

08:45 - 09:00 **6 - Selective fractionation and depolymerization of lignocellulosic biomass using subcritical and supercritical water to produce hemicellulose, cellulose and lignin** & \$
Gianluca Gallina - University of Valladolid – Spain; Juan Garcia-Serna, Maria Jose Cocero - University of Valladolid – Spain; Pierdomenico Biasi - Åbo Akademi - Spain

09:00 – 09:15 **25 - Oxygen/steam charcoal gasification in a fluidized alumina bed** & (
Jose Luis Sanchez - Universidad de Zaragoza - Spain; Noemí Gil-Lalaguna, Fernando Bimbela - Universidad de Zaragoza – Spain; Rui Moreira, Rui Vaz, António Portugal - University of Coimbra - Portugal

09:15 - 09:30 **2 - A comparative experimental study on the impact of standard and torrefied wood pellets on the drive parameters of a stratified batch gasifier** & \$&
Maurizio Grigiante – Università di Trento – Italy; Daniele Antolini, Marco Brighenti – Università di Trento – Italy

09:30 - 09:45 **59 - Wet air oxidation for industrial wastewater and sludge treatment: First results of a new research program in Quebec** & \$-
Jean-Francois Vermette - Centre de transfert technologique en écologie industrielle – Canada; Sophie Girard - Centre de transfert technologique en écologie industrielle – Canada; Patrick Desjardins - Cégep de Sorel-Tracy

09:45 - 10:00 **84 - Development of treatment train based on green technologies for removal and recovery of naphthenic acids from oil-sand process affected wastewater** & %
Madhumita Ray – Western University - Canada; Hojatallah Seyedy Niasar, Jing Wan, Sreejon Das, Chunbao Xua – Western University - Canada

10:00 - 10:15 **82 - Scale-up of a novel non-enzymatic cellulose-to-glucose hydrolysis process** & %
Xavier Duret - Université de Sherbrooke - Canada; James Kong Win Chang, Jean-Michel Lavoie - Université de Sherbrooke - Canada

10:15 - 10:45 Coffee break/Networking

ECONOMIC AND ENVIRONMENTAL EVALUATION OF GREEN PROCESSES

10:45 – 11:00 **39 - How to reduce the energy costs of food and dairy products to spray drying?** & %
Pierre Schuck – Inra - France; Anne Dolivet, Serge Méjean, Romain Jeantet - Inra – France

11:00 – 11:15 **80 - Secondary metabolites a potential improvement for the economy of second generation biofuel production** - Thierry Ghislain - Université de Sherbrooke - Canada; Emmanuel Eysseric, Pedro A. Segura, Jean-Michel Lavoie - Université de Sherbrooke – Canada; Olivier Lalonde – CEROM - Canada

12:00 – 13:00 Lunch

Thursday, June 23, 2016 (continued)

13:00 – 16:30 Networking/*ad hoc* sessions/free time

MODELLING AND OPTIMIZATION I

- 16:30 – 16:45 **90 - Costa Rica coffee pulp (broza) Gasification: A stoichiometric- chemical equilibrium model** ^{*****} ' %
Hugo de Lasa - University of Western Ontario – Canada; Cindy Torres, Luis Urvina, Natalia Hernandez - Universidad de Costa Rica - Costa Rica
- 16:45 – 17:00 **37 - Energy integration of high pressure processes using gas turbines and internal combustion engines** ^{*****} ' (
Yoana García - University of Valladolid - Spain; Fidel A. Mato, M. Dolores Bermejo, Juan García, M. José Cocero - University of Valladolid - Spain
- 17:00 – 17:15 **30 - Kinetic modeling of carbon dioxide valorization with epoxides** ^{*****} ' ,
Lionel Estel - Normandie Université, LSPC, INSA de Rouen - France; Viviana Contreras Moreno, Alain Ledoux - Normandie Université, LSPC, INSA de Rouen – France; Rabah Azzouz, Vincent Levacher, Laurent Bischoff - Normandie Université COBRA – France; Salim Derrouiche - Veolia Recherche & Innovation - France
- 17:15 – 17:30 **28 - Production of lactic acid and glycolic acid in one-pot electrochemical cell** ^{*****} ' ()
Ching Shya Lee - University of Toulouse - France; Mohamed Kheireddine Aroua, Wan Mohd Ashri Wan Daud - University of Malaya – Malaysia; Patrick Cognet, Yolande Pérès - University of Toulouse - France
- 17:30 – 18:45 Poster Session and Social Hour
- 19:00 - 23:00 Conference Banquet

Friday, June 24, 2016

07:30 - 08:30 Breakfast

08:30 - 08:45 Announcements

NEW REACTION MEDIA AND CLEAN SOLVENTS

08:45 - 09:00 114 - **Converting softwood to hardwood with supercritical fluids and gas-expanded liquids** - Paul Charpentier – Western University – Canada; L. Yang, William, Xu, Converting – Western University – Canada.

09:00 – 09:15 69 - **Study of chitosan enzymatic gelation kinetics for membrane preparation** - Jean-Pierre Mericq - Institut Européen des Membranes - France; Damien Wlodarczyk, Laurence Soussan, Denis Bouyer, Catherine Faur - Institut Européen des Membranes – France

09:15 – 09:30 115 - **Decarboxylating Free Fatty Acids into Fuels Using Subcritical Water** & Zakir Hossain, Anil Jhavar, M. Chowdhury, Paul Charpentier – Western University – Canada

09:30 - 09:45 34 - **Efficient production of soy-bean lecithin - Pluronic L64® encapsulated quercetin particles in nanometric scale using SFEE and PGSS drying processes** - György Lévai - University of Valladolid – Spain; Ángel Martín, Soraya Rodríguez-Rojo, María José Cocero - University of Valladolid – Spain

09:45 – 10:00 106 - **Extraction of Algae Oil in Supercritical CO2 using a Soybean Surfactant** - Osariemen Ogbeide – Western University – Canada, Madhumita Ray, Paul Charpentier – Western University - Canada

10:00 – 10:30 **Closing Remarks: What is next? Future directions in Green Process Engineering**

10:30 – 11:30 Coffee break and Poster Session

12:00 – 13:30 Lunch and departures

Green Process Engineering

Poster Presentation List

1. **Microwave assisted pyrolysis of waste from short rotation coppice of poplar******* *\$
Mattia Bartoli, University of Florence, Italy; Marco Frediani, University of Florence, Italy ;
Piero Frediani, University of Florence, Italy ; Luca Rosi, University of Florence, Italy

2. **Natural cellulose coated dispersions: new opportunities in green process engineering and applications******* *%
Dmitry M. Rein, Technion, Israel; Sofia Napso, Technion, Israel ; Gilad Alfassi, Technion, Israel ; Hitomi Miyamoto Hitomi Miyamoto, Technion, Israel ; Yachin Cohen, Technion, Israel

3. **Green nanotechnology enabling waterproofing, repair and reuse of consumer electronics******* * &
Simon McElrea, Semblant, USA

4. **Conception and optimisation of heat integrated distillation column (HIDiC)******* *'
Omar YALA, chemical engineering laboratory / ENSIACET, France; David Rouzineau, LGC/ENSIACET ; Michel Meyer, LGC/ENSIACET