

# **61st Canadian Chemical Engineering Conference 2011**

## **Innovation, Industry and Internationalization**

**London, Ontario, Canada  
23-26 October 2011**

**ISBN: 978-1-62276-317-7**

**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© (2011) by the Chemical Institute of Canada / Institut de Chimie du Canada  
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the Chemical Institute of Canada / Institut de Chimie du Canada  
at the address below.

Chemical Institute of Canada / Institut de Chimie du Canada  
130 Slater Street, Suite 550  
Ottawa, Ontario, Canada  
K1P 6E2

Phone: (613) 232-6252  
Fax: (613) 232-5862

[info@cheminst.ca](mailto:info@cheminst.ca)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## PL1 - PLENARY LECTURE - 1

Global Technology Integration: Chemical Engineering is the Fundamental Knowledge Base for a Sustainable Economy .....	1
<i>Fung D.</i>	

## BIO1 - ANTIBODY PRODUCTION AND ENGINEERING 1 (SPONSORED BY NSERC'S MABNET)

Strategies for the Production of Single Glycoform Monoclonal Antibodies .....	2
<i>Butler M.</i>	
Glycomics: Method Development and Applications for the Analysis of Monoclonal Antibodies using MALDI-MS .....	3
<i>Perreault H., Bodnar E.D., Marron S., Lattova E.</i>	
A Dynamic Model for MAB Production by Normal and Apoptotic CHO Cells .....	4
<i>Naderi S., Meshram M., Budman H., Scharer J., Ingalls B., McConkey B.</i>	
Analysis of Bioactivity in Yeast Lysates for Supplementation of Mammalian Cell Culture Media .....	5
<i>Chan S., Spearman M., Jung V., Kowbel V., Butler M.</i>	
Development and Application of a Rational Design for the Rapid Evaluation and Optimization of Animal Component Free Media Formulations A Methodical Approach .....	6
<i>Murayyan A., Nowruzi K., Dutton R.L., Hayward G.L.</i>	
Effect of Cell Culture Media on Lipid-Linked Oligosaccharide Composition in CHO-EG2 Cells .....	7
<i>Liu B., Butler M., Spearman M.</i>	
Modulating Autophagy Increases Protein Production in CHO Cell Fed-batch Processes .....	8
<i>Piret J.M., Jardon M.A., Nasseri S.S., Stichling N., Cheng X., Saitha B., Leung A.O., Braasch K., Butler M., Cote H.C.F., Gorski S.M.</i>	

## BIO2 – MICROBIAL SYSTEMS IN BIOTECHNOLOGY AND THE ENVIRONMENT

Continuous Ferrous Iron Biooxidation by Free Suspended <i>Leptospirillum ferriphilum</i> at Low pH .....	9
<i>Penev K., Karamanov D.</i>	
Biodegradable, Edible Wheat Gluten Films: Development of Water Based Films .....	10
<i>Cousineau J.L.A., Moresoli C., Legge R.L.</i>	
Synthesis of Sugar Ester Fatty Acids using Immobilized Lipase in Supported Sol-gels .....	11
<i>Kumar N., Legge R.L.</i>	
Properties of Thermoplastic Starch and Sisal Fibers Reinforced Starch Based Composites .....	12
<i>Falah Toosi S., Hrymak A., Liu Q.</i>	
Covalent Linkage of Proteins to Bacterial Cellulose for Targeted Delivery .....	13
<i>Cook J.R., Small D.P., Spaic M., Wan W.K.</i>	
Synthesis and Implementation of a Gold Nanoparticle- Functionalized Nanocrystalline Cellulose Complex for Targeted Delivery of Macromolecular Nucleic Acids .....	14
<i>Spaic M., Small D., Wan W.K.</i>	
Quantitation of Algal Cell Growth and Neutral Lipid Production in Microplates .....	15
<i>Held P.</i>	
Acidithiobacillus ferrooxidans Can Use Electrical Current as a Sole Energy Source .....	16
<i>Karamanov D.G.</i>	

## CAT1 – NOVEL CATALYST PREPARATION

Substituted Pyrochlore Catalysts for Fuel Reforming .....	17
<i>Spivey J.J., Haynes D., Berry D., Shekhawat D., Smith M.</i>	
Fischer Tropsch Synthesis of Gasoline Range Hydrocarbons over Fe/ZSM5 Catalysts .....	18
<i>Baranak M., Gurunlu B., Atakul H., Sarıoglu A.</i>	
Optimization of Catalyst Distribution along a Diesel Oxidation Catalyst .....	19
<i>Abedi A.</i>	
Effect of Chelating Ligands As Precursors on NiMo Based Catalysts Using LGO as Feed .....	20
<i>Gudiyannan S.D., Kotikalapudi C., Hwang D.K., Dalai A.K., Chopra S.J., Saraf D.N.</i>	
Novel Catalysts for Asphaltenes Adsorption and Gasification .....	21
<i>Hassan A., Nassar N., Lopez-Linares F., Aramburre L.C., Pereira-Almao P.</i>	
Catalytic Behavior of Highly Active TPA Doped SBA-15 in the Production of Biodiesel from Green Seed Canola Oil .....	22
<i>Baroi C., Dalai A.K., Sharma R.</i>	

<b>Metal Oxide Nanocatalysts for Enhanced Catalytic Cracking, Oxidation, and Steam Gasification of Waste Hydrocarbons.....</b>	23
<i>Nassar N.N., Hassan A., Pereira-Almao P.</i>	

## **ENR1 - BIODIESEL**

<b>Use of Whey in a New Industrial Process Aimed At Optimizing Mixotroph Microalgae Growth for Biodiesel Production.....</b>	24
<i>Girard J.M., Deschênes J.S., Tremblay R., Heitz M., Faucheu N.</i>	
<b>FAME Production from Waste Cooking Oil Using a Membrane Reactor .....</b>	25
<i>Tremblay A.Y., Dubé M.A., Hasswa R.</i>	
<b>A Single-Step Solid Acid-Catalyzed Process for the Synthesis of Biodiesel from Jatropha Oil as Second Generation Feedstock using Versatile Green Catalysts.....</b>	26
<i>Baig A., Ng F.T.T.</i>	
<b>A Simple and Green Analytical Method for Determination of Acid Number of Biodiesel and Biodiesel Blends using Green Chemistry Approaches.....</b>	27
<i>Baig A., Paszti M.D., Ng F.T.T.</i>	
<b>Insitu Transesterification of Soy Bean Oil.....</b>	28
<i>Pisters K., Prakash A.</i>	
<b>Novel Green Process for the Production of Biodiesel from Multi-Feedstock using Second Generation Heterogeneous Acid Catalysts.....</b>	29
<i>Baig A., Ng F.T.T.</i>	
<b>Soy Biodiesel Production over Mg-Zn Mixed Oxide Catalysts .....</b>	30
<i>Nagaraju P., Rampel G., Ng F.</i>	
<b>Value Added Uses of Crude Glycerol for Biomaterial Applications .....</b>	31
<i>Reddy M., Mohanty A., Misra M.</i>	

## **ENR2 – OIL SANDS-UPGRADING**

<b>Effect of Addition of Citric Acid on the Hydrotreating Activity of NiMo/ <math>\gamma</math>-Al<sub>2</sub>O<sub>3</sub> Catalysts .....</b>	32
<i>Mohanty S., Dalai A., Adjaye J.</i>	
<b>Physical Activation of Oil Sands Coke Using CO<sub>2</sub>.....</b>	33
<i>Karimi A., Thinon O., Tinguely S.B., Hill J.M., Ouyang T., Jia C.Q., Fournier J.</i>	
<b>The Effect of Temperature and Pressure on Low Temperature Oxidation Kinetics of Alaska Heavy Oil.....</b>	34
<i>Khansari Z., Mahinpey N.</i>	
<b>Study of Nitrogen Removal from Heavy Oil Using Natural Zeolites and Model Compounds .....</b>	35
<i>Rocha G., Kuznicki S.M., Yang S., McCaffrey W.C.</i>	
<b>Characterization of Asphaltene and its Sub-fractions by UV-vis Spectrophotometer and ESI FT ICR-MS .....</b>	36
<i>Wang S.S., Shi Q., Gray M.R., Xu C.M., Zhao S.Q.</i>	
<b>Particle Attrition with Supersonic Nozzles in a High Temperature Fluidized Bed .....</b>	37
<i>Briens C., Li F., Berruti F., Mcmillan J.</i>	
<b>Stability of Liquid-Solid Agglomerates in Gas-Solid Fluidized Beds .....</b>	38
<i>Berruti F., Parveen F., Briens C., Mcmillan J.</i>	

## **ENV1 – ADVANCED TECHNOLOGIES FOR WASTE TREATMENT 1**

<b>Energy Consumption in Microwave Pyrolysis of Biomass .....</b>	39
<i>Sobhy A., Farag S., Chaouki J.</i>	
<b>Modeling of the Toxic Intermediates Formation During the Phenol Removal by the Measure of Physical Parameters .....</b>	40
<i>Martínez C., Méndez S., Camarero L.M., Barambones O., Villota N.</i>	
<b>Sulphur Dioxide as an Activating Agent for Sulphur-Impregnated Activated Carbon from Petroleum Coke .....</b>	41
<i>Morris E.A., Choi R., Jia C.Q.</i>	
<b>Evaluation of Anion Exchange Resins for the Removal of Natural Organic Matter in Surface Water .....</b>	42
<i>Imoberdorf G., Mohseni M.</i>	
<b>Incorporation of Devulcanized Rubber in a Virgin Tire Rubber Compound.....</b>	43
<i>Meysami M., Zhu S., Tzoganakis C.</i>	
<b>Characterisation of Polymeric Flat Membranes and Compatibility with Various Aqueous Amine Solutions used for CO<sub>2</sub> Capture.....</b>	44
<i>Bougie F., Lalonde J., Iliuta M.C.</i>	
<b>The Impact of Biofilm Growth and Evolution on Porous Medium Hydraulic Properties.....</b>	45
<i>Bozorg A., Gates I.D., Sen A.</i>	

## **ENV2 – EMERGING CONTAMINANTS**

<b>Pharmaceutical Substances in the Great Lakes Region: A Review .....</b>	46
<i>Otker Uslu M., Jasim S., Biswas N.</i>	

<b>Mineralization of Bisphenol A in a Heterogeneous Catalytic Ozonation System .....</b>	47
Keykavous R., Soltan J.	
<b>Catalytic Ozonation of Micro-pollutants Using Manganese Oxide and Cerium Supported on Alumina .....</b>	48
Roshani B., Kathpalia V., McMaster I., Soltan J.	
<b>Genotoxicity of Endocrine Disrupting Compound Intermediates Formed in Various Advanced Oxidation Processes .....</b>	49
Gilmour C., Ali S., Rehmann L., Ray M.	
<b>Acyclovir Removal from Aqueous Solution on Activated Carbon: Kinetic and Thermodynamic Studies.....</b>	50
Jain S., Dalai A.K., Vyas R.K., Kumar P., Pandit P.	
<b>Photocatalalytic Degradation of Celecoxib by means of Advanced Oxidation Processes .....</b>	51
Hashim N., Ray A.K.	
<b>Catalytic Ozonation of Micro-pollutants Using Manganese Oxide and Cerium Supported on Alumina .....</b>	52
Roshani B., Kathpalia V., McMaster I., Soltan J.	
<b>Improving Anaerobic Digestibility of Natural Estrogens by the Application of Advanced Oxidation Processes .....</b>	53
Chawla C., Ray M., Nakha G.	

### **MSE1 – POLYMERIZATION REACTION ENGINEERING 1**

<b>Waterborne Mechanical Dispersions to Replace Solvent Borne Coating Binders.....</b>	54
Beigzadeh D.	
<b>Investigation of Ethylene Polymerization Kinetics with rac-Et(Ind)<sub>2</sub>ZrCl<sub>2</sub> in a Solution Reactor .....</b>	55
Mehdiabadi S., Soares J.B.P.	
<b>Photoinduced Degradation of Poly (N-vinylpyrrolidone ) in Aqueous Solution by Iron Salts: Degradation Mechanism and Kinetic Modeling.....</b>	56
Ghafoori S., Mehrvar M., Chan P.	
<b>Parameter Estimation in a Nylon 66 Degradation Model.....</b>	57
Karimi H., Schaffer M.A., McAuley K.B.	
<b>One-Pot Enzymatic Synthesis of Polyesters with Thermally Sensitive Functionalities .....</b>	58
Nosella K., Faucher S.	
<b>An Experimental and Theoretical Investigation on the Synthesis of High-molecular Weight Linear and Branched Poly lactides.....</b>	59
Mantourlias T., Seretis A., Karidi K., Kiparissides C.	

### **MSE2 – POLYMERS IN NANOTECHNOLOGY 1**

<b>Polymeric Nanostructures for Chemical and Biomedical Applications .....</b>	60
Tam M.	
<b>Surface-Initiated Ethylene "Living" Polymerization on Silica Nanoparticles with Covalently Supported Pd-Diimine Catalysts: Control of Polymer Graft Density and Chain Structural Parameters .....</b>	61
Xiang P., Ye Z.	
<b>Fluorescent, Thermo-Responsive Copolymers Synthesised by Nitroxide Mediated Polymerization .....</b>	62
Lessard B., Ling E., Maric M.	
<b>One-Pot "Arm-First" Synthesis of Core-Crosslinked Multiarm Star Polyethylene via Palladium-Catalyzed "Living" Ethylene Polymerization .....</b>	63
Landry E., Ye Z.	
<b>Polymer Semiconductors for Printed Organic Electronics.....</b>	64
Li Y., Sun B., Hong W., Aziz H.	

### **NNO1 – SYNTHESIS, CHARACTERIZATION AND TOXICITY CONTROL OF NANOMATERIALS**

<b>Nanoparticle Flotation Collectors-Balancing Hydrophobicity and Colloidal Stability .....</b>	65
Pelton R.	
<b>Silver Nano-Particles Synthesis, Scale-Up and Characterization for Fabrication of High-Conductivity Elements for Printed Electronics .....</b>	66
Mokhtari M., Saban M., Wong Y., Gaynor R., Wu Y.	
<b>Synthesis of Novel Metal Silicide Nanostructures as Catalyst Support for PEMFCs .....</b>	67
Norouzi Banis M., Zhang Y., Sun S., Meng X., Li R., Cai M., Sun X.	
<b>Mechanical and Interfacial Properties of Nanocellulose Composites Prepared Through Layer-by-Layer Assembly .....</b>	68
Cranston E.D.	
<b>Gold Nanomaterials and Their Influence on Surface Enhanced Raman (SERS) Spectroscopy .....</b>	69
Chen T., Jervis E., Henneke D., Woodford C.	
<b>Visible Light Active Fe Doped TiO<sub>2</sub> Nanowires Grown on Graphene using Supercritical CO<sub>2</sub> .....</b>	70
Farhangi N., Charpentier P., Chowdhury R., Medina-Gonzalez Y., Ray M.	
<b>Safe Design of Nanomaterials via the Implementation of an Integrated EHS Computational Platform.....</b>	71
Kiparissides C.	

## **PTF1 – MULTIPHASE SYSTEMS 1 – DEDICATED TO NORMAN EPSTEIN**

<b>Transport Phenomena in High Pressure Gas-Liquid-Solid Reactors .....</b>	72
<i>Macchi A.</i>	
<b>Application of Radioactive Particle Tracking to Indicate Shed Fouling in the Stripper Section of a Fluid Coker .....</b>	73
<i>Sanchez Careaga F., Granovskiy M., Pugsley T.</i>	
<b>Imaging Particle Hydrodynamics in Fluidized Beds and Risers .....</b>	74
<i>Cocco R.A., Shaffer F., Goalan B., Chew J-W., Hrenya C.M., Karri S.B.R., Knowlton T.M.</i>	
<b>Theory and Generation of a Controlled Size Single Micro-bubble .....</b>	75
<i>Seyyed Najafi A., Xu Z., Masliyah J.</i>	
<b>Transient Motion of Particles Undergoing Layer Inversion in Liquid-Fluidized Beds.....</b>	76
<i>Vivacqua V., Vashisth S., Epstein N., Grace J.R.</i>	
<b>Study of the Effect of Column Wall Material and Grounding on Electrostatic Charge Generation in Gas-Solid Fluidized Beds .....</b>	77
<i>Sowinski A., Giffin A., Mehrani P.</i>	
<b>Computational Fluid Dynamics of Fluidized Bed, the Good, the Bad, and the Beautiful.....</b>	78
<i>Taghipour F.</i>	

## **PSM1 – HAZARD IDENTIFICATION AND RISK ASSESSMENT 1**

<b>LOPA and HAZOP - The Odd Couple .....</b>	79
<i>de Salis C.</i>	
<b>Maximizing the Benefit of the Guideword Approach to Hazard and Operability Studies by Addressing the Design Intent.....</b>	80
<i>Phillips K.G.</i>	
<b>Hazard Identification and Risk Assessment at Irving Oil Company Ltd.'s Refinery in Saint John, NB .....</b>	81
<i>Johnson J.W.D., Cheddie H.L.</i>	
<b>Turnaround Interval Management of Change.....</b>	82
<i>Marta M.</i>	
<b>The Formal Adoption of a Process Safety Management Methodology Within an International Oil &amp; Gas Pipeline Company.....</b>	83
<i>Urra S., Timbers B.</i>	

## **GLB1 – GLOBALIZATION AND PARTNERSHIP**

<b>Catmint Oil as a Strategy to Fight Malaria in Burundi, Africa .....</b>	84
<i>Patience G.S., Kararirekinyana G.</i>	

## **SRE1 – NOVEL CHEMICAL AND CATALYTIC PROCESS DEVELOPMENT 1**

<b>Design of Novel DeNOx Catalysts for Mobile Sources: New Challenges and New Solutions .....</b>	85
<i>Fuentes G.A.</i>	
<b>Effect of Intraparticle Diffusion Resistances on Coupling of Dehydrogenation of Ethylbenzene to Styrene and Hydrogenation of Nitrobenzene to Aniline .....</b>	86
<i>Abo-Ghander N.S., Logist F., Grace J.R., Van Impe J.F.M., Elnashaie S.S.E.H., Lim C.J.</i>	
<b>n-Butane Partial Oxidation to Maleic Anhydride: A Global Transient Kinetic Model .....</b>	87
<i>Shekari A., Patience G.S.</i>	
<b>Aerosol Reactor for Kinetic Study of Pyrolysis of Heavy Oils .....</b>	88
<i>Vafi K., McCaffrey W.C., Gray M.R.</i>	
<b>A Nanoengineered VO<sub>x</sub> Catalyst Supported on Highly Ordered TiO<sub>2</sub> Nanotube arrays. Synthesis, Characterization and Activity for Ethanol Partial Oxidation.....</b>	89
<i>Herrera J.E., Isimjan T.T., Ray A.K., Rohani S.</i>	
<b>Ferrofluid Applications in Chemical Engineering.....</b>	90
<i>Hajiani P., Larachi F.</i>	
<b>Effect of the Crude Oil Composition on Low Severity Hydro-processing of Heavy Oils and Bitumen using Ultradispersed Catalysts .....</b>	91
<i>Peluso E., Pereira-Almao P.</i>	

## **PL2 – PLENARY LECTURE - 2**

<b>Energy for the World - Today and Tomorrow - A Perspective .....</b>	92
<i>Chen J.C.</i>	

## **BIO3 – ANTIBODY PRODUCTION AND ENGINEERING 2 (SPONSORED BY NSERC'S MABNET)**

<b>Evaluation of Different Quenching and Extraction Methods Used for Nucleotide / Nucleotide Sugar Analysis .....</b>	93
<i>Braasch K., Villacrés C., Butler M.</i>	

<b>Expression of N-Acetylglucosaminyltransferase III for In Vitro Remodeling of Antibody Glycosylation Pattern</b>	94
Wagner A., Guillemette G., Aucoin M.G.	
<b>Sialylation of Monoclonal IgGs</b>	95
Raymond C., Bisson L., St-Laurent G., Kelly J.F., Durocher Y.	
<b>Feasibility Study for the Removal of Monoclonal Antibody Aggregates using Membrane Chromatography</b>	96
Sadavarte R., Fraud N., Ghosh R.	
<b>Monoclonal Antibody Purification with Ion Exchange Membranes</b>	97
Hassel K., Moresoli C.	
<b>Model-based Optimization of MAb Production in CHO-DG44 Cell Culture</b>	98
Nowruzi K., Murayyan A., Dutton R., Hayward G.	
<b>Modification of Monoclonal Antibody Glycans Using Glycoprotein Processing Inhibitors</b>	99
Spearman M.A., Chan S., Butler M.	
<b>Monitoring Changes in a CHO Cell Culture using 2D Fluorescence Spectroscopy</b>	100
Ohadi K., Budman H., Legge R.	
<b>Proteomic Analysis of Chinese Hamster Ovary Cells Producing Glycosylated Monoclonal Antibodies</b>	101
Ho R., McConkey B.J.	
<b>Comparative Study of Recombinant Equine Chorionic Gonadotropin (eCG) Expressed in Three Different Cell Lineages: Correlation Between Glycosylation and Biological Activity</b>	102
Coelho T.M., Carreira A.C.O., Butler M., Sogayar M.C.	
<b>Effect of the Intracellular Redox Environment on Monoclonal Antibody Assembly and Glycosylation in NS0 Cell Culture</b>	103
Dionne B., Butler M.	

## **BIO4 – FOREST BIOREFINING TECHNOLOGIES AND PRODUCTS**

<b>Production of Aromatics using Microwave Pyrolysis of Lignin</b>	104
Farag Sh., Sobhya A., Akyle C., Chaouki J.	
<b>Lignin Biorefining Integrated to a Kraft Pulp Mill</b>	105
Zaballos P.Z., Barahona J.B., Kannangara M.K., Kouissi L.K., Jemaa N.J., Paris J.P.	
<b>Biomass Gasification Integrated into a Kraft Process-based Forest Biorefinery</b>	106
Rofouie P., Colombo P., Moshkelani M., Perrier M., Paris J.	
<b>Forest Biorefinery Maximizing the Value of Trees</b>	107
Xu C.	

## **BIO5 – INTEGRATION AND SUSTAINABILITY OF THE FOREST BIOREFINERY**

<b>Integration of a Hemicelluloses-based Biorefinery into a Canadian Kraft Pulp Mill: Material and Energy Analysis</b>	108
Rafione T., Ajao O., Radiotis T., Jemaa N., Marinova M.	
<b>An Innovative Optimization Methodology to Increase Water and Energy Efficiency of Kraft Mills</b>	109
Keshkar M.J., Moshkelani M., Savulescu L., Paris J.	
<b>Impact of Energy and Climate Policy for the Selection of Sustainable Forest Biorefinery Strategies - Paper Withdrawn</b>	110
Batsy D., Brown M.A., Samson R., Stuart P.R.	
<b>The Integrated Forest Biorefinery and the Greening of the Pulp and Paper Industry</b>	111
Moshkelani M., Marinova M., Perrier M.	
<b>Synthesis of Lignin Acetate for Biomaterials</b>	112
Yuan Z., Xu C., Lo J.	

## **BIO-P – POSTER SESSION**

<b>Cultivation of Micro-algae by Bubble-free Carbon Dioxide Mass Transfer Using Microporous Membranes</b>	113
Balgobin R., Karamanev D., Bassi A.	
<b>Feasibility of the Immobilized Soil Bioreactor to Treat Naphthenic Acids in Oil Sands Process Waters</b>	114
McKenzie N., Ramsay R., Ramsay B., Wang J.	
<b>Effects of Surface Treatment and Process Parameters on Immobilization of Recombinant Yeast Cells by Adsorption to Fibrous Matrices</b>	115
Kilonzo P.M., Margaritis A., Bergougnou M.A.	
<b>Butanol Production by Clostridium acetobutylicum ATCC 824 Grown on Sugars Found in Agricultural Waste Hydrolyzates: Effect of Sugars on Fermentation Kinetics</b>	116
Kilonzo P.M., Margaritis A., Bergougnou M.A.	
<b>Lipase Mediated Enantioselective Kinetic Resolution of 2-Octanol: Optimization and Kinetic Modeling</b>	117
Yadav G.D., Sontakke J.B.	
<b>Generation of Recombinant Product from Cyanobacterium <i>S. elongatus</i> PCC 7942 in Photobioreactor</b>	118
Kuan D., Posarac D., Duff S., Bi X., Yewalkar S.	
<b>Production of Recombinant Enzyme with Genetically-Modified Synechococcus in Photobioreactor</b>	119
Wu T., Bi X.T., Duff S., Posarac D., Yewalkar S.	
<b>Production and Characterization of Polyhydroxybutyrate (PHB) from the Cyanobacterium <i>Spirulina platensis</i></b>	120
Mika A., Small D.P., Oliveira M.B., Wan W.K.	

<b>Flux Balance Analysis of <i>Bacillus Subtilis</i> Metabolism Using NMR Measured Metabolite Concentrations .....</b>	121
<i>Aucoin M.G., Ingalls B.P., Wright G., Charles T.C., Kimaev G., Tkatch D.</i>	
<b>Protein of Silkworm Pupa Hydrolysis by Alcalase: Effects of Process Parameters on Hydrolysis and Solubilization .....</b>	122
<i>Zhao Z.X., Liao D.K., Sun J.H., Shang X.Q., Tong Z.F.</i>	
<b>NIPAAm Based Cell Delivery Scaffolds for Interocular Use .....</b>	123
<i>Muirhead B.B., Fitzpatrick D.S., Jafar Mazumder M.A., Sheardown H.</i>	
<b>Imaging Drug Distribution and Measuring Drug Diffusivity in the Vitreous Body .....</b>	124
<i>Gajraj R.</i>	
<b>Evaluation of Novel pNIPAAm-based Materials in Injectable, Accommodating Intraocular Lens Applications .....</b>	125
<i>Perry R.E., Jafar Mazumder M.A.</i>	
<b>Design of Organogels for Sustained Delivery of Hydrophobic Drugs .....</b>	126
<i>Chung O., Xu S., Cheng Y.L., Acosta E.J.</i>	
<b>On-demand, Targeted Drug Delivery using Injectable Magnetic Thermosensitive Nanocomposites .....</b>	127
<i>Campbell S.B., Maitland D., Jellema E., Young S., Hoare T.R.</i>	
<b>Bioactivity of Novel Poly (ε-caprolactone)-Bioactive Glass Hybrid Biomaterials.....</b>	128
<i>Allo B., Mequanint K., Amin R.</i>	
<b>Bioconversion of Jerusalem Artichokes for Biofuel Production .....</b>	129
<i>Sarchami T., Rehmann L.</i>	
<b>Evaluation of the Potential Mutagenicity of BPA via the Ames Fluctuation Test .....</b>	130
<i>Mehdizadeh Allaf M., Ali S., Rehmann L., Ray M.</i>	
<b>Profiling and Comparing the Catabolic Function of Fixed Film, Rhizospheric and Interstitial Bacterial Communities in Mesocosm-scale Treatment Wetlands.....</b>	131
<i>Weber K.P., Legge R.L.</i>	
<b>Bacterial Cellulose Nanofiber Production Using Honey as a Natural Carbon Source.....</b>	N/A
<i>Gholami A., Small D.P., Wan W.</i>	
<b>Mechanical Properties of Electrospun Polycaprolactone (PCL) Nanofibres.....</b>	133
<i>Makareni S., Wan W., Hutter J.</i>	
<b>Determination of Concentration Distribution in an Immobilized Biocatalyst Using Diffusion-Reaction Model With External Mass Transfer Effects .....</b>	134
<i>Jameel A.T., Hoda A.</i>	

## **CAT2 – NANOCATALYSIS & NOVEL CATALYTIC MATERIALS 1**

<b>Towards a Renewable Transportation Fuel: Catalyzed Ammonia-Borane Dehydrogenation for Chemical Hydrogen Storage .....</b>	135
<i>Baker R.T.</i>	
<b>Experimental Study of Ultra-Dispersed Catalysts Propagation at Near In-Reservoir Condition .....</b>	136
<i>Hashemi R., Pereira Almão P.</i>	
<b>Biochar-based Catalyst for Biodiesel Production .....</b>	137
<i>Dehkhoada A.M., Ellis N.</i>	
<b>Visible-light Photocatalysis Using Carbon-doped TiO<sub>2</sub> .....</b>	138
<i>Gamage McEvoy J., Comeau T., Zhang Z.</i>	
<b>Challenges in Development of Redox Catalysts for Selective Transformations of Organic Compounds into Value Added Chemicals .....</b>	139
<i>Yadav G.D., Gawade B.</i>	
<b>Synthesis of Novel Rare Earth Metal Catalysts for Preparation High Performance Rubbers .....</b>	140
<i>Cui D., Jian Z.</i>	
<b>Diesel and Biodiesel Steam Reforming with Nickel-Alumina Spinel Catalyst for Solid Oxyde Fuel Cell Application.....</b>	141
<i>Achouri E.I., Abatzoglou N., Braidy N.</i>	
<b>A Comparative Study for Cod Liver Fish Oil Hydrolysis with <i>Candida cylindracea</i> and <i>Candida rugosa</i> Lipases.....</b>	142
<i>Sharma A., Chaurasia S.P., Dalai A.K.</i>	

## **CAT-P – POSTER SESSION**

<b>Effect of S Poisoning on Pt-AE/γ-Al<sub>2</sub>O<sub>3</sub> (AE = Ba, K, Ba+K) Catalytic Systems .....</b>	143
<i>S. Pieta I., García-Díéguez M., Larrubia M.A., Alemany L.J., Eppling W.S.</i>	
<b>Trifluoroethanol Expedited Carbon Dioxide for Selective Hydrogenation of Cinnamaldehyde over Pt or Pd Catalysts .....</b>	144
<i>Zhao B.-H., Chen J.-G., Liu X., Liu Z.-W., Liu Z.-T.</i>	
<b>Evaluation of a Compound Derived From MgAlZn HDL as Photocatalyst in the Reduction Of Cr(VI) .....</b>	145
<i>Alanis-Ramirez C., Barrera-Díaz C., Natividad R., Roa-Morales G., Romero R., Sanchez-Valente J.</i>	
<b>Solid-State Synthesis and Photocatalytic Performance of LiVMoO<sub>6</sub> .....</b>	146
<i>Hurtado-Alva M.L., Natividad R., Romero R., Ramirez-Serrano A., Torres-García E.</i>	
<b>Study of Reduction of Olefin for FCC Gasoline by ZSM-5/MCM-41 Composite Molecular Sieve.....</b>	147
<i>Deku J., Yufeng Y., Fuchen D., Siauw N.</i>	
<b>National Ultrahigh-Field NMR Facility for Solids .....</b>	148
<i>Terskikh V.</i>	

<b>XANES, EXAFS and DRIFT Studies on Sulphur Deactivation of the Ni-Based Catalysts for CO<sub>2</sub> Reforming of CH<sub>4</sub>.....</b>	149
<i>Shakouri M., Zhao X., Tian L., Sridarala R., Hu Y., Wang H.</i>	
<b>Oxygen-Free Oxidative Dehydrogenation of Ethane over VO<sub>x</sub>/γ-Al<sub>2</sub>O<sub>3</sub> Catalyst in Riser Reactor Simulator.....</b>	150
<i>Al-Ghamdi S.A., de Lasa H.I., Volpe M.</i>	

### **CEE-P – POSTER SESSION**

<b>Solubility of Abietic Acid in Alcohols.....</b>	151
<i>Nong W.J., Chen X.P., Wang L.L., Liang J.Z., Tong Z.F.</i>	

### **ENR3 – BIOMATERIALS, BIOCHAR**

<b>Water-blown Rigid Biofoams from Functionalized Soy oil based Biopolyurethane and Microcystalline Cellulose (MCC) for Automotive Applications .....</b>	152
<i>Luo X., Mohanty A., Misra M.</i>	
<b>Renewable Resource Based New Thermoset Resin/Lignin Hybrid Biomaterials: Processing and Properties Evaluation.....</b>	153
<i>Deka H., Misra M., Mohanty A.</i>	
<b>Torrefaction of Flax Straw using a Thermogravimetry Analysis.....</b>	154
<i>Vincent S., Mahinpey N., Mani T., Murugan P.</i>	
<b>Biochar Production and Its Application .....</b>	155
<i>Berruti F., Cruz D., Mohammad J., Ferrante L., Briens C.</i>	
<b>Development of an Innovative Torrefier.....</b>	156
<i>Sule I., Dutta A.</i>	

### **ENR4 – BIOCHEMICAL PROCESSES**

<b>Enhanced Biobutanol Production in Simultaneous Saccharification and Fermentation with Kinetic Analysis.....</b>	157
<i>Thirmal C., Dahman Y.</i>	
<b>Sonicated Biological Hydrogen Reactor for Biohydrogen Production.....</b>	158
<i>Elbeshbisy E., Hafez H., Nakhl G.</i>	
<b>Effective Choice of Bacterial Strain and Optimal Feedstock Composition in the Fermentation of Butanol Bio-Fuel .....</b>	159
<i>Al Nedaff H., Turcotte G., Dahman Y.</i>	
<b>Fermentative Butanol Production Using a Pervaporation Membrane Reactor .....</b>	160
<i>Kanjilal B., Li S.Y., Srivastava R., Parmas R.</i>	

### **ENR5 – OIL SANDS - EXTRACTION**

<b>Effect of Aromatic Contaminants in Paraffinic Froth Treatment Solvent on Asphaltene Precipitation .....</b>	161
<i>Xu Y., Dabros T., Kan J.</i>	
<b>The Effect of Shear Exposure on Oil Sand Lump Ablation .....</b>	162
<i>Pazouki M., Sanders R.S.</i>	
<b>Use of a Clay Binder for Improving Processability of Low-grade Oil Sand Ores .....</b>	163
<i>Tseng H., Xu Z.</i>	
<b>Kinetics of Solvent Recovery from Non Aqueous Extracted Oil Sands Tailings - Abstract Withheld .....</b>	N/A
<i>Vagi L., Tan X., Nikakhthari H., Gray M.R., Choi P., Liu Q.</i>	
<b>Liquid-Liquid Equilibrium Properties of Bitumen + Light Hydrocarbons Mixtures: Potential for In Situ and Surface Upgrading.....</b>	165
<i>Nourozieh H., Kariznovi M., Abedi J.</i>	

### **ENR6 – OIL SANDS – IN SITU EXTRACTION**

<b>Performance Enhancement of VAPEX by Temporal Variation of Solvent Injection Pressure .....</b>	166
<i>Muhamad H., Uperti S., Lohi A., Doan H.</i>	
<b>Density Prediction for Mixtures of Heavy Oil and Dissolved Gas .....</b>	167
<i>Saryazdi F., Schoegl F., Yarranton H.W</i>	
<b>Feasibility of Immiscible Cyclic CO<sub>2</sub> Injection (CO<sub>2</sub> Huff-and-Puff) in Heavy Oil Reservoirs, Experimental Study.....</b>	168
<i>Firouz Q., Torabi F.</i>	
<b>Cyclic CO<sub>2</sub> Injection.....</b>	169
<i>Alshmakhy A., Maini B.</i>	

### **ENR-P – POSTER SESSION**

<b>Improvement of Fuel Oil by Means of Asphaltene Extraction.....</b>	170
<i>Hernandez-Castillejos B., Sanchez-Minero F., Silva-Oliver G., Ramos-Melendez N.</i>	

<b>Biodiesel Production Using Ion-exchange Resin Catalyst Combined with Emulsification Mixing of Raw Oil and Methanol.....</b>	171
<i>Nigahara Y., Sungwornpatansakul P., Yoshikawa K.</i>	
<b>Effect of Substrate Over Biogas Production Using Rabbit Waste .....</b>	172
<i>Teniza O., Solis M.</i>	
<b>Biobutanol Production from Wheat Straw by Simultaneous Saccharification and Fermentation Using Clostridium fusant : Batch Process .....</b>	173
<i>Begum S., Dahman Y.</i>	
<b>Process Kinetics of Bunsen Reaction in Presence of Organic Solvent for H<sub>2</sub>S Splitting Cycle and S-I Cycle of H<sub>2</sub> Production .....</b>	174
<i>Li J., Wang H., Chuang K.T.</i>	
<b>Synthesis of CO<sub>2</sub> Hydrates in a Slurry Bubble Column with a Promoter .....</b>	175
<i>Oddy S., Myre D., Servio P., Macchi A.</i>	
<b>Synthesis of Novel Polymer for Selective Removal of Neutral Nitrogen Species from HGO to Study Inhibition/Deactivation of Catalyst Active Sites .....</b>	176
<i>Rizwan D., Dalai A.K., Adjaye J.</i>	
<b>Analysis of Centralized Large Scale Hydrogen Production to Meet Ontario's Hydrogen Economy Demands .....</b>	177
<i>Liu H., Elkamel A., Fowler M., Almansoori A.</i>	
<b>Gas Phase and Surface Kinetics of Diesel Surrogate Reforming.....</b>	178
<i>Parmar R.D., Shekhwat D., Peppley B.A., Karan K.</i>	
<b>Effect of Ethyl Disulfide on the Catalytic Activity of Nickel Catalyst During Steam Reforming of Methane.....</b>	179
<i>Shanmugapriya K., Abatzoglou N.</i>	
<b>Detail Heat, Mass and Transport Study in Catalytic Plate Fuel Reformer using Microkinetics .....</b>	180
<i>Mundhwa M.A., Parmar R.D., Peppley B.A., Thurgood C.</i>	
<b>Experimental Study of Steam Utilization in a High-Temperature Copper (II) Chloride Hydrolysis Reactor .....</b>	181
<i>Pope K., Wang Z., Naterer G.F.</i>	
<b>The Investigation of Emulsion Filter Cakes Formed During the Ultrafiltration of Canola Oil in Water and in a Membrane Reactor for the Production of Biodiesel .....</b>	182
<i>Falahati H., Tremblay A.Y.</i>	
<b>Ethanol Dehydration With Protein Extracted Canola Meal in a Pressure Swing Adsorption Process.....</b>	183
<i>Ranjbar Z., Kumar P., Dalai A.K., Niit C.H.</i>	
<b>Natural Gas Processes: LNG and GTL, Process Simulation, Modeling, and Economic Analysis .....</b>	184
<i>Alsobhi S., Elkamel A.</i>	

#### **ENV3 – ADVANCED TECHNOLOGIES FOR WASTE TREATMENT 2**

<b>A New Approach to Model Biofilm Phase Development in Porous Media .....</b>	185
<i>Bozorg A., Sen A., Gates I.D.</i>	
<b>Combination of Various Pretreatments with Ultrasonication for Enhanced Biohydrogen Production from Food Waste.....</b>	186
<i>Elbeshbishi E., Hafez H., Dhar B.R., Nakhla G.</i>	
<b>Extraction of Poly Unsaturated Fatty Acids from Biomass using Supercritical CO<sub>2</sub> Technique .....</b>	187
<i>Tilay A., Azargohar R., Dalai A., Annapure U., Kozinski J.</i>	
<b>Carbon Capture from a Waste Biomass by Microwave Pyrolysis.....</b>	188
<i>Namazi A., Jia C.Q., Allen D.G.</i>	

#### **ENV4 – WATER AND WASTEWATER MANAGEMENT**

<b>Tailing in UV Disinfection of Wastewater and the Effect of Sludge Retention Time and Process Type.....</b>	189
<i>Azimi Y., Allen G., Cairns B., Dropo I., Seto P., Farnood R.</i>	
<b>Nutrient Removal from Greenhouse Effluent by Natural Zeolites.....</b>	190
<i>Chandhok G., Bassi A.S.</i>	
<b>Electrochemical Coagulation for the Production of Drinking Water from Natural Waters: Optimization for Reduction in Dissolved Organic Carbon.....</b>	191
<i>Dubrawski K., Fauvel M., Mohseni M.</i>	
<b>Modeling of Lead Corrosion in Drinking Water Distribution Systems .....</b>	192
<i>Hassan A.E.M.T., Robinson C., Herrera J.E.</i>	
<b>Detection of Micron and Submicron Sized Pathogens in Water by Combining Electrokinetic Sampling and Raman Spectroscopy.....</b>	193
<i>Tomkins M.R., Docolis A.</i>	

#### **ENV5 – RESOURCE RECOVERY AND CONSERVATION**

<b>Ecopark Optimization Based on Profit and Environmental Impact .....</b>	194
<i>Kantor I., Elkamel A., Fowler M.W.</i>	
<b>Safe Sequestration of Carbon Dioxide in Underground Aquifers .....</b>	195
<i>Peachey B.R.</i>	

<b>Production of Cellulose Nanofibers from Pine Cone using Ultrasonication.....</b>	196
<i>Rambabu N., Azargohar R., Dalai A.K., Mohini S.</i>	
<b>Process Integration for Industrial Water and GHG Conservation: Applications and Opportunities .....</b>	197
<i>Powell E., Vlajnic G., Wang Z., Anweiler A.</i>	
<b>Geothermal Energy Recovery from Mines .....</b>	198
<i>Scott J.A., Hall A., Graham C.</i>	
<b>Characterization and Reuse/Recycle Options for AV-Cell Fly Ash .....</b>	199
<i>Adeoti I.A., Hawboldt K., Iliyas A.</i>	

#### **ENV-P POSTER SESSION**

<b>CFD Modeling for Floc Breakage in Orifice Flow.....</b>	200
<i>Fernandes A.X., Lawryshyn Y., Gibson J.H., Farnood R.R.</i>	
<b>Ultrasound Aided Pretreatment of Wheat Dried Distillers Grain (DDG) for Extraction of Phenolic Compounds.....</b>	201
<i>Izadifar Z., Baik O.D.</i>	
<b>Determination of Optimum Solvent Condition and Diffusion Kinetics for Extraction of Phenolic Compounds from Wheat Dried Distillers Grain (DDG).....</b>	202
<i>Izadifar Z., Baik O.D.</i>	
<b>The Effect of Deposition Conditions on the Photocatalytic Efficiency and Integrity of TiO<sub>2</sub> Film for Air Purification.....</b>	203
<i>Lin P., Truica-Marasescu F., Ramsay J., Docoslis A.</i>	
<b>Degradation by Ultrasonic Irradiation of a BETX-Phenol Mixture Using Hydrogen Peroxide.....</b>	204
<i>Paredes Carrera S.P., Valenzuela Zapata M.A., Hernández Pichardo M.L., Sánchez Ochoa J.C., Rodríguez Clavel I.S.</i>	
<b>Decontamination of Drinking Water by a Combined Photocatalysis-Sorption Couple System.....</b>	205
<i>Paredes S.P., Valenzuela M.A., Hernández-Pichardo M.L., Rodríguez-Clavel I.S.</i>	
<b>Photolytic, Photocatalytic, Sonophotolytic, and Sonophotocatalytic Degradation of Methylene Blue in Multilamp Photoreactor.....</b>	206
<i>Mohajerani M., Mehrvar M., Ein-Mozaffari F.</i>	
<b>Precipitate Recycling: A New Approach to Wastewater Treatment by Peroxidase-catalyzed Phenol Polymerization .....</b>	207
<i>Feng W., Taylor K.E., Bewtra J.K., Biswas N.</i>	
<b>Cyanide and Organic Compounds Removal from Industrial Wastewater using Fenton and Fenton Like Techniques.....</b>	208
<i>Zouli N., Ismail E., Merrouf A.</i>	
<b>Interfacial Properties of Surfactant-like Materials from Wastewater Biomass.....</b>	209
<i>Acosta E., Baxter M., Wells B.</i>	
<b>Investigation of Corrosion Inhibitors and their Inhibitive Effect of Some Novel Organic Dyes on the Corrosion of M57S Aluminium-Magnesium Alloy in Alkaline Media.....</b>	210
<i>Patel P., Barot T.G.</i>	
<b>Photocatalytic Degradation of Reactive Orange 16 in Slurry Photo-Reactor Using N-doped TiO<sub>2</sub> Nanoparticles .....</b>	211
<i>Madani M., Nasernejad B., Fathizadeh M., Mahmudi G.</i>	

#### **FN-P – POSTER SESSION**

<b>Measurement and Correlation of VLE Data for α-Pinene + p-Cymene + (S)-(−)-Limonene Ternary System at Atmospheric Pressure .....</b>	212
<i>Tong Z.F., Sun L.X., Liao D.K., Yang Z.Y., Chen X.P.</i>	
<b>Effect of Nano NaX Zeolite on PES Membrane Using for Ethanol/Water Pervaporation Performance.....</b>	213
<i>Rabiee F., Aroujalian A., Raisi A., Fathizadeh M.</i>	
<b>Optimization of High Voltage Pulsed Electric Field on Extraction of the Total Saponins of Gymnema sylvestre by Response Surface Methodology .....</b>	214
<i>Sun J.H., Liao D.K., Wei Z.Z., Chen X.G., Tong Z.F.</i>	
<b>Recovery of Precious Metals through Biosorption .....</b>	215
<i>Yao S., Hossain M.R., Alam S., Zhang Y.</i>	
<b>Fabrication of Silver/Polyethersulfone Nanocomposite Membrane with Antibacterial Activity .....</b>	216
<i>Toroghi M., Aroujalian A., Raisi A., Fathizadeh M.</i>	
<b>Mixing of Yield-Pseudoplastic Fluids with an Anchor-Scaba Co-Axial Mixer .....</b>	217
<i>Pakzad L., Ein-Mozaffari F., Upreti S.R., Lohi A.</i>	
<b>Solubility and Ksp of Mg(OH)<sub>2</sub> and Mg<sub>4</sub>Al<sub>2</sub>(OH)143H<sub>2</sub>O at the Various Ionic Strengths .....</b>	218
<i>Li Z., Gao W., Li Z.</i>	
<b>Use of Rotating Toroid for Friction Loss Prediction of Settling Slurries.....</b>	219
<i>Hegde R.</i>	
<b>Effect of Initial Conditions of Porous Support Layer on Polyamide Preference and Surface Properties .....</b>	220
<i>Fathizadeh M., Aroujalian A., Raisi A.</i>	

## **MSE3 – POLYMERIZATION REACTION ENGINEER 2**

<b>Macromolecular Reaction Engineering of Controlled Radical Polymerization - What Can Chemical Engineers Contribute to Polymer Science.....</b>	221
<i>Zhu S.</i>	
<b>Increasing the Versatility of Nitroxide Mediated Polymerization to Make New Functional Materials.....</b>	222
<i>Maric M.</i>	
<b>Advances in Living/Controlled Polymerization in Waterborne Systems: New Opportunities in Designing Latexes with Tailored Microstructure and Properties .....</b>	223
<i>Cunningham M.F.</i>	
<b>Monitoring and Control of Particle Sizes and Morphology in Suspension Polymerizations with NIRS.....</b>	224
<i>Pinto J.C.</i>	
<b>Free Radical Copolymerization Kinetics of Hydroxy-Functional Monomers.....</b>	225
<i>Liang K., Hutchinson R.A.</i>	
<b>Application of Parameter Selection and Estimation Techniques in a Thermal Styrene Polymerization Model.....</b>	226
<i>Woloszyn J.D., McAuley K.B.</i>	
<b>Dynamic Plant Simulation for the High-Pressure LDPE Process.....</b>	227
<i>Krallis A., Pladis P., Balsas A., Kiparissides C.</i>	

## **MSE-P – POSTER SESSION**

<b>Physical Functionalization of Microparticles with DNA.....</b>	228
<i>Kesselman L., Johnstone S., Li J., Filipe C., Li Y., Shinwary Syed S., Ali M., Hoare T.</i>	
<b>Polymer Design using Latent Variable Methods .....</b>	229
<i>Tzoc M., Nichols E., MacGregor J., Hoare T.</i>	
<b>Microfiltration of Microgel Particles .....</b>	230
<i>Pan S., Tzoc M., Hoare T., Ghosh R.</i>	
<b>Characterization of Ethylene-/Olefin Copolymers Made with a Single-Site Catalyst Using Crystallization Elution Fractionation.....</b>	231
<i>Al-Khazaal A., Soares J.</i>	
<b>Preparation of Polymer-Nanocrystalline Cellulose via Electrospinning Techniques.....</b>	232
<i>Finkle A.C., Reddy C.R., Eder P., Simon L.C.</i>	
<b>Controlled Homopolymerization of 4-Acryloylmorpholine by Nitroxide Mediated Polymerization: Application to Block Copolymers with Carbazole Functionality .....</b>	233
<i>Lessard B., Savelyeva X., Maric M.</i>	
<b>Mathematical Modelling of Free-radical Polymerization and Diffusion of Acrylamide and Bisacrylamide in Polymer Gel Dosimeters Used in Radiation Dose Detection for Brachytherapy.....</b>	234
<i>Nasr A.T., Schreiner L.J., McAuley K.B.</i>	
<b>The Role of Renewable Feedstock for Thermoplastic Composites .....</b>	235
<i>Simon L.</i>	
<b>Analysis of the Effectiveness of Mixing on MMA Solution Polymerization in a CSTR .....</b>	236
<i>Fathi Roudsari Sh., Ein-Mozaffari F., Dhib R.</i>	
<b>Experimental Measurements and Modeling of Vapor-Liquid Equilibrium in Binary Systems of Volatile and Normal Heavy Hydrocarbons at Elevated Temperatures .....</b>	237
<i>Kariznovi M., Nourozieh H., Abedi J.</i>	

## **NNO2 – NANOMATERIALS IN BIOLOGICAL AND BIOMEDICAL ENGINEERING 1**

<b>Polymeric Nanoparticles for Targeted Delivery in Cancer .....</b>	238
<i>Shoichet M.</i>	
<b>Evaluating and Advancing the Use of Nanoscale Fibrils as Dry Adhesives.....</b>	239
<i>Gates B.D., Li Y., Zhang C., Zhou J., Zhang X., Menon C.</i>	
<b>Controlled Release of Doxorubicin from Polyglutamic Acid-Composite Nanoparticles.....</b>	240
<i>Margaritis A., Hellmers F., Koropatnick J., Ferguson P.</i>	
<b>High Sensitive Biosensor Platform Based on OMCVD Grown Gold Nanoparticles for Multiple Biomarker Detection .....</b>	241
<i>Ertorer E., Jiang H., Tingjie L., Yang J., Sabarinathan J., Mittler S.</i>	

## **NNO3 – FUNCTIONAL NANOCOMPOSITES 1**

<b>Plastic Solar Cells .....</b>	242
<i>Leclerc M.</i>	
<b>Synthesis and Characterization of Polycyclopentene@Carbon Nanotubes Coaxial Nanocables.....</b>	243
<i>Muboyayi B., Ye Z., Xu L.</i>	
<b>Superhydrophobic RTV Silicone Rubber Coatings for High Voltage Insulators .....</b>	244
<i>Seyedmehdi S., Zhang H., Zhu J.</i>	

<b>Numerical Estimation of the Effective Thermal Conductivity of Nanofluids.....</b>	245
<i>Aristizabal F., Feichtinger C., Coulombe S.</i>	

### **NNO-P – POSTER SESSION**

<b>A Facile Method to Tune Zeolite L Crystals .....</b>	246
<i>Gaona-Gomez A., Cheng C.-H.</i>	
<b>Photosensitization of ScCO<sub>2</sub> Synthesized TiO<sub>2</sub> Nanowires Decorated with ZnS and ZnTeS Quantum Dots for Photovoltaic Devices.....</b>	247
<i>Chowdhury R.R., Moula G., Charpentier P.A.</i>	
<b>Mass Producing of High-Purity Carbon Nanopearls by Chemical Vapour Deposition Method .....</b>	248
<i>Sadeghvishkaei M., Yunus R., Ahmad A., Mohd Salleh M.A., Pignolet A.</i>	
<b>Development of Water Dispersible Iron Oxide Nanocubes .....</b>	249
<i>Chen L., Zhang J.</i>	
<b>Development of CdSe Quantum Dots with a pH-sensitive Hydrogel Coating.....</b>	250
<i>Chen L., Willoughby A., Zhang J.</i>	
<b>Localized Delivery of Growth Factor through New Nanocomposites for Ocular Burn .....</b>	251
<i>Zhang J., Postovit L., Zhang G., Bi R., Hodge W., Yin P.</i>	
<b>Direct Carbon Nanotube Growth on Stainless Steel 304 .....</b>	252
<i>Baddour C.E., Meunier J.-L.</i>	
<b>Direct Growth and Removal of Carbon Nanotubes from Stainless Steel 316 Mesh .....</b>	253
<i>Hordy N., Coulombe S., Meunier J.L.</i>	
<b>Effects of the Ni:PVP Mass Ratio of Nickel Nanoparticles Synthesized by a Modified Polyol Method on the Purification of Histidine-tagged Recombinant Proteins .....</b>	254
<i>Parisien A., Ahmed A., Al-Zarka F., Baranova E.A., Thibault J., Lan C.Q.</i>	
<b>New Developments of Atomic Force Microscopy for Surface Science in Biology, Chemistry and Materials Engineering .....</b>	255
<i>Yang J.</i>	
<b>Synthesis of Ag-TiO<sub>2</sub> Nanocomposite Thin Film for Antibacterial Application .....</b>	256
<i>Yu B.Y., Lau L., Yang J.</i>	
<b>Nanophase Separation Control of Semiconductor Blends for Organic Solar Cells .....</b>	257
<i>Murphy L., Li Y., Aziz H.</i>	
<b>Nitrogen Doped Graphene Nanoplatelets for Supercapacitor Application .....</b>	258
<i>Davies A., Yu A.</i>	
<b>Functionalization and Characterization of the Nanofillers for Homogeneous Dispersion into Epoxy Resins.....</b>	259
<i>Meschi Amoli B., Zhao B., Hu A., Zhou N.</i>	
<b>Chitosan-based Nanoparticles for Encapsulation and Controlled Release of rh-Erythropoietin: A Response Surface Approach.....</b>	260
<i>Margaritis A., Bulmer C., Xenocostas A.</i>	
<b>Mechanical Response of Silica Nanoparticles Incorporated Into a Poly-HEMA-Based Matrix.....</b>	261
<i>Zhang J., Yin P., Kim H.</i>	
<b>Production of Nanocrystalline Cellulose from Bacterial Cellulose for Drug Delivery .....</b>	262
<i>Small D.P., Li X., Gholami A., Wan W.K.</i>	
<b>Effect of Different Solvents on Thin Film Nano-Zeolite/Polyamide Composite Reverse Osmosis Membrane.....</b>	263
<i>Fathizadeh M., Aroujalian A., Raisi A.</i>	

### **PTF2 – MULTIPHASE SYSTEMS 2 – DEDICATED TO NORMAN EPSTEIN**

<b>Perspectives on Chemical Looping Technology Reaction, Reactor and Solids Flow.....</b>	264
<i>Fan L.-S.</i>	
<b>Uniformity of Gas-Solid Flows Through Y-shaped-bifurcation .....</b>	265
<i>Vashisth S., Grace J.R.</i>	
<b>Down Flow Reactor Fluid Dynamics. Looking to the Rotational Flow Velocity Components .....</b>	266
<i>Abbassi A., Islam A., Ege P., de Lasa H.</i>	
<b>Optimization of Spouted Bed Scale-up by Square-based Multiple Unit Design .....</b>	267
<i>Rovero G., Curti M., Cavaglià G.</i>	

### **PTF3 – SPOUTED BED – DEDICATED TO NORMAL EPSTEIN**

<b>Spouting Characteristics of SPF Wood Pellets.....</b>	268
<i>Haddou J.V.H., Ellis N., Bi X.T., Epstein N.</i>	
<b>Radioactive Characterization of the Gas Residence Time Distribution in Spouted Beds.....</b>	269
<i>Spreutels L., Chaouki J., Bertrand F., Haut B., Legros R.</i>	
<b>Modeling and Simulation of Cavity Formation and Breakup Forces in Conical Spouted Beds .....</b>	270
<i>Wen L.Y., Bi X.T.</i>	
<b>Spouted Bed Gasification and Pyrolysis-A Review.....</b>	271
<i>Watkinson A.P.</i>	

<b>Average Cycle Times of the Solid in Draft-tube Conical Spouted Beds.....</b>	272
<i>Olazar M., Altzibar H., Lopez G.</i>	
<b>Simulation of Gas-Solid Flow in a Conical-Cylindrical Spouted Bed by DEM.....</b>	273
<i>Ren B., Zhong W.Q., Jin B.S., Yuan Z.L., Yong L.</i>	

#### **PTF4 – STUDENT ORAL COMPETITION**

<b>Foam Granulation Using a Twin Screw Extruder.....</b>	274
<i>Weatherley S., Thompson M.R., Sheskey P.J.</i>	
<b>Economic and Environmental Analyses of Nanofluid Based Solar Water Heaters.....</b>	275
<i>Niknami M., Siddiqui K., Khayat R.E.</i>	
<b>Numerical Modeling of Thermo-Viscous Fingering Instabilities in Porous Media .....</b>	276
<i>Azaiez J., Sajjadi M.</i>	
<b>Modeling and Simulation of Turbulent Gas-Particle Regime in a Circulating Fluidized Bed Biomass Gasifier.....</b>	277
<i>Liu H., Elkamel A., Mazda B., Lohi A.</i>	
<b>Effects of Internal on Local Heat Transfer and Column Hydrodynamics in Bubble Columns .....</b>	278
<i>Jhawar A.K., Prakash A.</i>	
<b>Hydrodynamics of High Flux Circulating Turbulent Fluidized Bed Reactor .....</b>	279
<i>Qi M., Zhu J., Barghi S.</i>	
<b>Calibration Protocol of Circulating Fluidized bed bioreactor (CFBFR) Models Used for Biological Wastewater Treatment .....</b>	280
<i>Eldyasti A., Nakhl G., Zhu J.</i>	
<b>Numerical Simulation of the Counter-Current High Density Gas-Solid Flow in FCC Stripping Section .....</b>	281
<i>Jia D., Zhao H., Yang C.</i>	
<b>Estimation of the Droplet Size Distribution in Emulsions Using CFD .....</b>	282
<i>Fathi Roudsari Sh., Dhib R., Ein-Mozaffari F.</i>	
<b>Investigations of Axial and Radial Variations of Heat Transfer Coefficient in Single and Binary Particle Bubbling Fluidized Beds with Fast Response Probe .....</b>	283
<i>Pisters K., Prakash A.</i>	
<b>Experiments on Gas-Solid Flow Behaviors of a Pressurized High-flux Circulating Fluidized Bed - Not Available.....</b>	N/A
<i>Yin S.Y., Jin B.S., Zhong W.Q., Lu Y., Shao Y.J., Liu H.</i>	
<b>Thermal Convective of Non-Fourier Fluids. Part I. Linear and Weakly Nonlinear Analyses.....</b>	285
<i>Mohammahhasabi Khorasany R., Stranges D.F., Khayat R.E.</i>	

#### **PTF-P – POSTER SESSION**

<b>Upgrading Residue by Carbon Rejection in a Fluid-Bed Reactor.....</b>	286
<i>Wang G., Wang H., Shen B., Guo Q., Xu C., Gao J.</i>	
<b>Temperature-dependent In Situ Raman Spectroscopic Observation of Methanol-loaded Hydroquinone Clathrate .....</b>	287
<i>Nam B.-U., Yoon J.-H., Lee H.-H., Kim B.-S., Lee K.-W., Moon D., Shin H.J., Han K.W.</i>	
<b>Pressure-driven Structural Transition of Hydroquinone Clathrates .....</b>	288
<i>Kim B.-S., Yoon J.-H., Lee H.-H., Nam B.-U., Lee K.-W., Moon D., Shin H.J., Han K.W.</i>	
<b>The Development of Residue Pre-treating Catalyst for Decarbonization and Demetallation Used in Fluid Bed Reactor.....</b>	289
<i>Shen B., Wang G., Wang H., Gao J., Guo Q., Xu C.</i>	
<b>Foam Granulation of Pharmaceutical Powders Using Twin Screw Extruder .....</b>	290
<i>Mu B., Thompson M.R., Sheskey P.J.</i>	

#### **PSM2 – HAZARD IDENTIFICATION AND RISK ASSESSMENT 2**

<b>Molybdenum Nanoparticle Sizing by Time-Resolved Laser-Induced Incandescence.....</b>	291
<i>Sipkens T., Joshi G., Daun K., Murakami Y.</i>	
<b>A Proven Approach to Revalidating Process Hazard Reviews .....</b>	292
<i>Phillips K.G.</i>	
<b>An Overview and Update of Simplified BLEVE Predictions .....</b>	293
<i>Pierorazio A.J., Syed Z.A.</i>	
<b>Probabilistic Modeling of Domino Effect in Process Systems using Bayesian Networks - Paper Withdrawn .....</b>	294
<i>Khakzad N., Khan F.</i>	
<b>Evolution of Process Hazard Analysis in an Oil &amp; Gas Pipeline Company: From Ad-hoc to an Enterprise Standard Practice .....</b>	295
<i>Urrea S., Timbers B.</i>	
<b>Application of Advanced Quantitative Risk Assessment Methods to Cigar Lake Mine Flood Control Strategy .....</b>	296
<i>Oliverio M., Carreiro J., Dixon B., Kaasalainen S</i>	
<b>Energy Costing and Development of the Land - Paper Withdrawn.....</b>	297
<i>Khakzad S., Saraf R.V.</i>	

## **SNC1 – APPLIED STATISTICAL METHODS**

<b>A Bayesian Approach to Process Identification in the Presence of Outliers .....</b>	298
<i>Khatibisepehr S., Huang B.</i>	
<b>Comparison of Multi-Blocks PLS Algorithms for Large Scale Processes .....</b>	299
<i>Lauzon-Gauthier J., Duchesne C., Tessier J.</i>	
<b>Robust MSE-based Methods for Selecting Parameters to Estimate.....</b>	300
<i>McLean K.A.P., McAuley K.B.</i>	
<b>Recovery Boiler Monitoring Based on PCA and Decision Tree.....</b>	301
<i>Tharrault Y., Amazouz M.</i>	
<b>A Bayesian Inference Based Gaussian Mixture Model for Chemical/Biological Process Fault Detection and Diagnosis.....</b>	302
<i>Yu J.</i>	

## **SNC-P POSTER SESSION**

<b>A Bayesian Inference based Support Vector Regression Approach for Soft Sensor Development in Batch Bioprocesses .....</b>	305
<i>Yu J.</i>	
<b>Simulation of Direct Synthesis of Gasoline via Alternative Fischer Tropsch Process - Zeolite Based Fischer Tropsh Catalyst .....</b>	306
<i>Baranak M., Baranak M., Gurunlu B., Atakul H.</i>	

## **SRE2 – NOVEL CHEMICAL AND CATALYTIC PROCESS DEVELOPMENT 2**

<b>Degradation of Solid Acrylonitrile-Butadiene-Rubber (NBR) via Cross-Metathesis with 1-Hexene.....</b>	307
<i>Rempel G., Pan Q., Wu J., Liu Y.</i>	
<b>High Gravity Reactor Fundamentals for Liquid-liquid Reactions.....</b>	308
<i>Atias J., Dixit R., West D.</i>	
<b>Hydrocracking of Athabasca Bitumen Using Ultradispersed Ni-W-Mo Catalysts at Conditions Near to In-Reservoir Operation: Effect of Porous Medium .....</b>	309
<i>Galarraga C.E., Carbonei L., Pereira-Almão P.</i>	
<b>Experimental Validation of Catalyst Activity Decay during Catalytic Cracking of Hydrocarbons.....</b>	310
<i>Jiménez-García G., de Lasa H., Quintana-Solórzano R., Maya-Yescas R.</i>	
<b>CREC-GS-Optiprobe for Measurement of Clusters in a Downer Reactor .....</b>	311
<i>Islam M.A., Krol S., de Lasa H.</i>	
<b>Catalytic Conversion of Glycerol into 1,2-Propanediol Using Cu/ZnO/Al<sub>2</sub>O<sub>3</sub> Catalyst .....</b>	312
<i>Liu Y., Nagaraju P., Kamalakar G., Rempel G.L., Ng F.T.T.</i>	
<b>Continuous Hydrogenation of Nitrile Rubber at Elevated Solute Concentration in a Multistage Agitated Contactor (MAC) and a Static Mixer Reactor (SMR).....</b>	313
<i>Akpan E.R., Pan Q., Rempel G.L.</i>	

## **SRE-P – POSTER SESSION**

<b>Hydrodynamic and Heat Transfer Study in Flat- and Corrugated- Wall Bubbling Fluidized Bed Reactors: Experiments and CFD Simulations .....</b>	314
<i>Wardag A.N.K., Larachi F.</i>	
<b>Water Splitting for Hydrogen Production Using Photocatalysis and Near-UV Radiation .....</b>	315
<i>Escobedo S., Serrano Rosales B., de Lasa H.</i>	

## **PL3 – PLENARY LECTURE-3**

<b>The Chemistry Industry in Canada - A Challenging Past with Opportunities for the Future.....</b>	316
<i>Marshall A.J.</i>	

## **BIO6 – BIOFUELS – ETHANOL AND BEYOND 1**

<b>Optimization of Ethanol Production Via Direct Cellulose Fermentation .....</b>	317
<i>Islam R., Sparling R., Cicek N., Levin D.B.</i>	
<b>Enzymes and Wood: Fundamentals of Penetration and Chemical Degradation .....</b>	318
<i>Jeremic D., Master E.</i>	
<b>Laccase Production of White Rot Fungi Under Different Conditions of Carbon and Nitrogen Sources in Copper-contained Media.....</b>	319
<i>Kannaiyan R., Mahinpey N., Mani T., Martinuzzi R., Kostenko V.</i>	

<b>Economic Evaluation of the Re-adsorption of Hydrolytic Enzymes Onto Fresh Substrate After Enzymatic Hydrolysis of Pre-treated Wheat Straw .....</b>	320
<i>Rosales O., Duff S., Posarac D.</i>	
<b>Process Control System Integration and Instrumentation Improvement for Biomass Processing.....</b>	321
<i>Ebert C., He B., Zheng J., Choo K., Rehmann L.</i>	
<b>Characterization of the Interactions of Cellulose, Hemicellulose, and Lignin During Pretreatment Through the Use of Flowthrough Pretreatment .....</b>	322
<i>McKenzie H.L., Engle N., Foston M.B., Ragauskas A.J., Tschaplinski T.J., Wyman C.E.</i>	
<b>High-throughput Screening for the Quantification and Mitigation of Inhibitory Effects of Biomass Hydrolysate on Ethanol Production .....</b>	323
<i>Nagendra V., Rehmann L.</i>	
<b>Ethanol Dehydration using Canola Meal in a Pressure Swing Adsorption Process .....</b>	324
<i>Tajallipour M., Kumar P., Niu C., Dalai A.</i>	

## **BIO7 – OPHTHALMIC MATERIALS AND DRUG DELIVERY 1 (SPONSORED BY 20/20: NSERC’S OPHTHALMIC MATERIALS NETWORK)**

<b>20/20 NSERC Ophthalmic Materials Network: Progress in Vision Health.....</b>	325
<i>Sheardown H.D.</i>	
<b>Novel Stimulus-Triggered Biodegradable Polymers and Their Applications .....</b>	326
<i>Wong A.D., DeWit M.A., Chen E.K.Y., Gillies E.R.</i>	
<b>Controlling Drug Release Kinetics from Soft Nanocomposite Hydrogels: Effect of Crosslinking .....</b>	327
<i>Sivakumaran D., Hoare T., Maitland D., Oszustowicz T.</i>	
<b>Investigating the Controlled Delivery of Roscovitine and Atropine to Improve Vision in Children .....</b>	328
<i>Lasowski F., Rahmani V., Sheardown H.</i>	
<b>Synthesis and Characterization of Polymer Microspheres for Biomedical and Nutraceutical Release .....</b>	329
<i>Salarian M., Charpentier P., Samimi R., Akhter K., Rezvani S., Lui E.</i>	
<b>Injectable Modular Hydrogels for Drug Delivery .....</b>	330
<i>Patenaude M.J., Hoare T.R.</i>	
<b>Microbial Production of Biopolymers with Tailor-made Molecular Properties: A Multi-scale Modeling Approach and Experimental Validation .....</b>	331
<i>Kiparissides C., Penloglou G., Chatzidoukas C.</i>	

## **CAT3 – NANOCATALYSIS & NOVEL CATALYTIC MATERIALS 2**

<b>Fischer-Tropsch Synthesis: Comparing Iron and Cobalt Catalysts .....</b>	332
<i>Davis B.H.</i>	
<b>Hydrotreatment of Coker Light Gas Oil Using SBA-15 Supported Nickel Phosphide Catalysts .....</b>	333
<i>Soni K., Boahene P., Dalai A.</i>	
<b>Rational Design of Core-Shell Bimetallic Nanoparticle Catalysts .....</b>	334
<i>Scott R.W.J., Balcha T., Calver C.F., Dash P., Strobl J.R.</i>	
<b>Selective Synthesis of Natural Benzaldehyde by Hydrolysis of Cinnamaldehyde Using a Novel Hydrotalcite Catalyst .....</b>	335
<i>Yadav G.D., Fernandes G.P.</i>	
<b>Preparation and Performance Evaluation of Ni/Al<sub>2</sub>O<sub>3</sub> Ultradispersed Nanocatalyst in Heavy Oil.....</b>	336
<i>Alkhaldi S.J., Husein M.M.</i>	
<b>Catalytic Incineration of Claus Tail Gas: Using Nanofibrous Au/La<sub>2</sub>O<sub>3</sub>/TiO<sub>2</sub> Catalysts.....</b>	337
<i>Clark P., Sui R., Dowling N., Huang M.</i>	

## **ENR7 – FUEL CELLS – CATALYSTS AND ELECTRODES**

<b>Effects of Porous Structure and Surface Chemistry of Carbon Electrode Material on the Performance of Supercapacitors .....</b>	338
<i>Cagriat J., Jia C., Kirk D.</i>	
<b>Carbon Nanotube Core and Metal Free CN<sub>x</sub> Shell Nanostructures as Oxygen Reduction Reaction Electrocatalysts .....</b>	339
<i>Higgins D.C., Chen Z.</i>	
<b>Atomic Layer Deposition of Pt Nanocatalyst on Graphene and N-doped Graphene for PEM Fuel Cell Applications.....</b>	340
<i>Sun S., Gauquelin N., Zhang G., Meng X., Geng D., Li R., Ye S., Knights S., Botton G., Sun X.</i>	
<b>Non-Precious Metal Catalyst Showing High Activity and Stability towards Oxygen Reduction Reaction in Zinc Air Fuel Cell Application.....</b>	341
<i>Chen Z., Choi J.-Y., Wang H., Li H., Chen Z.</i>	
<b>Highly Active Nitrogen Doped Carbon Nanotube as Air Cathode Catalyst for Zinc Air Fuel Cell .....</b>	342
<i>Chen Z., Zhu S., Wang H., Li H., Chen Z.</i>	
<b>Pyrolyzed Non-precious Electrocatalyst Using Fe-N Coordinated Nitrogen-rich Precursor in Acid.....</b>	343
<i>Wu J., Li W., Chen Z.</i>	
<b>High Power Supercapacitor Electrodes from Graphene .....</b>	344
<i>Davies A., Yu A.</i>	

<b>Biologically Inspired, Highly Durable Fe-SPc Catalysts for Oxygen Reduction Reaction in PEM Fuel Cells.....</b>	345
Wu J., Li W., Chen Z.	

## **ENR8 – PYROLYSIS AND BIO-OIL**

<b>Development of a Novel Experimental Method for Measuring the Thermal Stability of Pyrolysis Oils .....</b>	346
Briens C., Siriwardhana M., Mohammad J., Berruti F.	
<b>Simultaneous Copyrolysis of Heavy Oil and Sawdust Bio-oil in a Continuous Mechanically Fluidized Bed.....</b>	347
Berruti F., Lance R., Xu R., Ferrante L., Briens C., Hagey L.	
<b>Biomass Conversion through Hydrous Pyrolysis.....</b>	348
Lee H., Dharma D., Hsie B., Tang G., Chakrabarti D.	
<b>Lignin Pyrolysis in a Fluidized Bed Reactor with Fractional Condensation.....</b>	349
Briens C., Lago V., Palmisano P., Berruti F.	
<b>Study of Bio-oil from Liquefaction of Pinewood Sawdust .....</b>	350
Wang Y., Zheng Y., Lin H.F., Wang H.	
<b>Fractional Condensation of Bio-Oil.....</b>	351
Briens C., Tumbalam Gooty A., Mohammad J., Berruti F.	

## **ENV6 – ADVANCED OXIDATION PROCESSES**

<b>Sulfadiazine Mineralization Using Batch and Continuous Sonophotolytic Process .....</b>	352
Mohajerani M., Mehrvar M., Ein-Mozaffari F.	
<b>Photodegradation of Poly (Ethylene Oxide) by UV/H<sub>2</sub>O<sub>2</sub> Process: Experimental Analysis and Kinetic Modeling Approach .....</b>	353
Ghafoori S., Mehrvar M., Chan P.	
<b>Catalytic Ozonation of Toluene Using Mn/γ-Al<sub>2</sub>O<sub>3</sub> and Mn/MCM-41.....</b>	354
Rezaei E., Soltan J.	
<b>Modeling and Validation of a Rotating Corrugated Drum Reactor Utilizing Novel Photocatalyst for Wastewater Treatment .....</b>	355
Donaldson A.A., Gamage J., Ye A., Zhang Z.	
<b>Computational Fluid Dynamics of Multilamp Photoreactors .....</b>	356
Mohajerani M., Mehrvar M., Ein-Mozaffari F.	
<b>TOC Removal of Pharmaceutical Wastewater using Combined Granular Activated Carbon and UV/H<sub>2</sub>O<sub>2</sub> Processes .....</b>	357
Ghafoori S., Mehrvar M., Chan P., Shah K.	
<b>Applicability of the Fe-assisted Photocatalytic Reactions to Dissimilar Compounds: Positive Effect of Fe Ions on Mineralization Rates of Maleic acid, Oxalic Acid, Formic Acid, Paraquat, Phenol and 4-Chlorophenol .....</b>	358
Ortiz-Gomez A., Moreira del Rio J., Serrano Rosales B., de Lasa H.	

## **FN1 - THERMODYNAMICS**

<b>Effect of Temperature Gradient and Long-range Surface Interactions on Morphology Evolution in Polymer Blends.....</b>	359
Tabatabaeiyanzadi M., Chan P.K., Wu J.	
<b>Prediction of Multicomponent Diffusion Coefficients in Blended Amine Solutions using the PC-SAFT Equation of State.....</b>	360
Pan S., Li H., Zhu J., Zhang D.	
<b>Vapor-Liquid Equilibria of Carbon Dioxide-Containing Binary Mixtures near Their Critical Regions .....</b>	361
Afrianto A., Lee M.-J., Lin H.-M., Peng D.-Y.	
<b>Predicting Microemulsion Thermodynamics using UNIFAC and Curvature Models - Paper Withdrawn .....</b>	362
Boza A., Acosta E.	
<b>Molecular Level Modeling of Electrolyte Solubility and Applications to Alkali Halides and Their Mixtures in Water and in Hydrochloric Acid .....</b>	363
Smith W.R., Moucka F.	
<b>The Recycle of Volatile Anaesthetic Agents .....</b>	364
Williston M.M., Thurgood C.	
<b>Personal-portable Cooling Garment Based on Absorption Vacuum Membrane Evaporative Cooling .....</b>	365
Yang Y., Diagne B.T., Lan C.Q.	
<b>PVT Data Prediction for CO<sub>2</sub>BrineCH<sub>4</sub> in CO<sub>2</sub> Sequestration .....</b>	366
Zendehboudi S., Elkamel A., Shafiei A., Chatzis I., Leonenko Y.	

## **MSE4 – COMPOSITE AND HYBRID MATERIALS 1**

<b>Synthesis, Characterization, and Catalytic Latex Hydrogenation of Poly(methyl methacrylate)-polystyrene-poly(acrylonitrile-co-butadiene) Tri-layer Core-shell Nanoparticles</b>	367
<i>Wang H., Pan Q., Rempel G.L.</i>	
<b>Requirements for the Successful In Situ Production of Polyethylene-Clay Nanocomposites</b>	368
<i>Maneshi A., Soares J.B.P.</i>	
<b>Effect of Surface Functionalization of Multi-wall Carbon Nanotubes on the Properties of Ethylene-Octene Copolymer Nanocomposites</b>	369
<i>Osazuwa O., Kontopoulos M., Docoslis A., Zhibin Y.</i>	
<b>Linear Amphiphilic Copolymers Comprising a Synthetic Block and a Renewable (Polysaccharide) Block via Atom Transfer Radical Polymerization</b>	370
<i>Krasznai D., Champagne P., Cunningham M.</i>	
<b>Graft Copolymers of Cellulose Prepared Using SET-LRP in Ionic Liquid</b>	371
<i>Donaldson J., Champagne P., Cunningham M.</i>	
<b>Using RAFT Living Polymerization for Modifying Graphene Sheets for Next Generation Solar Thermal Cells</b>	372
<i>Gu R., Charpentier P.</i>	
<b>Ultra-Strong Polycarbonate Nanocomposites by Incorporating Very High Loading of Graphene Nanoplatelets</b>	373
<i>Davies A., Yu A.</i>	

## **NNO4 – FUNCTIONAL NANOCOMPOSITES 2**

<b>Novel Electrically Conductive Polymeric Nanocomposites for Electromagnetic Shielding Applications</b>	374
<i>Sundararaj U., Arjmand M., Gelvez G.A.</i>	
<b>Effect of In Situ Interfacial Reaction on Microstructure and Properties of Polypropylene Nanocomposites</b>	375
<i>Wan D., Wang Y., Wen X., Tang T.</i>	
<b>Processing of Carbon Nanofibre and Molecular Glass Nanocomposites for Chemical Sensor Applications</b>	376
<i>Amir T., Pagé D.J.Y.S., Lebel O.</i>	
<b>Surfactant Assisted Incorporation of Debundled Single Walled Carbon Nanotubes into a Biocompatible Polymer</b>	377
<i>Davis T.J., Zhang J., Herrera J.E.</i>	
<b>Biocellulose Nanofibers Modified with pHEMA using ATRP</b>	378
<i>Nakhoda H., Dahman Y.</i>	
<b>Field-switching Dynamics of Polymer Dispersed Liquid Crystal Functional Materials</b>	379
<i>Abukhdeir N.M.</i>	

## **PTF5 – NEW PRODUCTS AND GREEN TECHNOLOGIES FROM FLUIDIZED BED REACTORS**

<b>Advanced Fluidized Bed Reactors Reveal Cracking Chemistry</b>	380
<i>Ng S.H., Shi Y., Al-Sabawi M., Chen S., Yui S.</i>	
<b>Catalytic Cracking of Oil Sands Heavy Gas Oil and Its Blend with Canola Oil</b>	381
<i>Al-Sabawi M., Ng S.H., Shi Y., Chen S.</i>	
<b>Greener Power Generation Using Fluidized Bed Technologies</b>	382
<i>Wang J., Anthony E.J.</i>	
<b>Ash Deposition in Co-Firing Three-fuel Blends Consisting of Woody Biomass, Peat and Lignite in a Pilot-Scale Fluidized-bed Reactor</b>	383
<i>Shao Y., Xu C., Zhu J., Preto F., Wang J., Li H., Badour C.</i>	
<b>Light Olefins from Fluid Catalytic Cracking of Bitumen Derived Heavy Gas Oils</b>	384
<i>Wang J., Ng S.</i>	
<b>Artificial Neural Network Methodology for Modeling of a Liquid-Solid Circulating Fluidized Bed Riser</b>	385
<i>Razzak S.A., Rahaman S.M., Hossain M.M., Zhu J.</i>	
<b>DNS of Impact and Erosion on an Aligned Tube Bank by Coal Ash Particles in a Duct</b>	386
<i>Luo K., Fan J.R., Wang Z.L.</i>	

## **PSM3 – RISK CONTROL 1**

<b>Optimizing Chlorine Compression Design for Vapour Phase Nitrogen Trichloride Destruction</b>	387
<i>Norval G.W., Maka K.</i>	
<b>Implementing Risk Based Process Safety in an Upstream Oil/Gas Company</b>	388
<i>Guss D.</i>	
<b>Sunrise Propane Incident Investigation</b>	389
<i>Kassabian A.</i>	
<b>Implementation of Propane Risk &amp; Safety Management Plans Observations of a Veteran Risk Analyst</b>	390
<i>Oliverio M.</i>	

## **SNC2 – FUNDAMENTALS OF PROCESS CONTROL AND SYSTEM IDENTIFICATION**

<b>A Practical Approach to Plant-Wide Control of a Hybrid System: Application to a Portable SAGD Plant.....</b>	391
<i>Shook D.S.</i>	
<b>Active Fault Isolation of Nonlinear Process Systems.....</b>	392
<i>Du M., Mhaskar P.</i>	
<b>Design of Robust Nonlinear Model Predictive Controller based on Polynomial Chaos Expansion .....</b>	393
<i>Kumar D., Budman H.</i>	
<b>Model-based Fault Detection for Two Dimensional Systems using Polynomial Matrix Transformation.....</b>	394
<i>Wang Z., Shang H.</i>	
<b>Assessing Plant-Model Mismatch Using Signal Entropy .....</b>	395
<i>Shardt Y.A.W., Huang B.</i>	
<b>Adaptive Data-Based Model Predictive Control of Batch Systems .....</b>	396
<i>Aumi S., Mhaskar P.</i>	
<b>Considerations for the Tuning of Extremum Seeking Control Loops and Application to a Bioreactor Culture of Microalgae.....</b>	397
<i>Deschenes J.S., St-Onge P., Tremblay R.</i>	

## **IND1 – CHEMICAL INDUSTRY: TREND, NEED, LEAD**

<b>The Challenges and Achievements of Following the 12 Principles of Green Chemistry.....</b>	398
<i>van Leeuwen J.</i>	
<b>Sustainable Energy, Fuels and Chemicals: Challenges and Opportunities for Innovation .....</b>	399
<i>Chornet E.</i>	
<b>Cradle to Cradle (R) Care of Chemicals - Repositioning the Chemical Industry for Sustainability and Innovation .....</b>	400
<i>McGregor E.</i>	
<b>Understanding Sustainability - Can Chemical Engineers Take a Lead Role in Sustainable Innovation? .....</b>	401
<i>Lewis D.</i>	

## **SRE3 – GREEN REACTION ENGINEERING 1**

<b>Oxygen Carriers for Chemical Looping Combustion .....</b>	402
<i>Kaliaguine S., Sarshar Z.</i>	
<b>Chemical-Looping Combustion with Liquid Fuels-Thermodynamic Analysis .....</b>	403
<i>Hossein M., Quddus M., Razzak S., de Lasa H.</i>	
<b>Carbonation of Chrysotile Mining Residues for Atmospheric CO<sub>2</sub> Capture .....</b>	404
<i>Assima G.P., Larachi F., Beaudoin G., Molson J.</i>	
<b>CO<sub>2</sub> Capture Kinetics of Alkanolamine/Room-Temperature Ionic Liquid Emulsion System .....</b>	405
<i>Hasib-ur-Rahman M., Sajid M., Larachi F.</i>	
<b>CO<sub>2</sub> Capture in a Twin Fluidized Bed Configuration. A Thermodynamic Study .....</b>	406
<i>Choudhury M., de Lasa H.</i>	
<b>Ni-Co/La-Al<sub>2</sub>O<sub>3</sub> Oxygen Carrier for Fluidized Bed Chemical-Looping Combustion .....</b>	407
<i>Quddus M.R., Hossein M., de Lasa H.</i>	
<b>Intrinsic Kinetic Analysis of CaO- CO<sub>2</sub> Reaction Using Grain Model.....</b>	408
<i>Sedghkerdar M.H., Mahinpey N., Ellis N.</i>	

## **PL4 – PLENARY LECTURE-4**

<b>Chemical Engineering Innovation Needs for a Future Solar Economy .....</b>	409
<i>Agrawal R.</i>	

## **BIO8 – BIOFUELS – ETHANOL AND BEYOND 2**

<b>Alga-based Biofuel Production Under Canadian Conditions: Promises and Challenges .....</b>	410
<i>Lan C.Q.</i>	
<b>Screening Bacterial Strains for Use in a Microbial Fuel Cell Oxidizing Glycerol From Biodiesel Production.....</b>	N/A
<i>Reiche A.E., Kirkwood K.M.</i>	
<b>Clostridial Co-culture for Cellulosic Biobutanol Production .....</b>	412
<i>Salimi F., Mahadevan R.</i>	
<b>Enrichment of Exoelectrogenic Bacteria Communities for Ethanol Microbial Fuel Cells .....</b>	413
<i>Chao R., Mohseni M.</i>	
<b>Pyrolytic Sugars Fermentation in Bio-oil Upgrading.....</b>	414
<i>Luque L., Berruti F., Rehmann L.</i>	
<b>GreenField's G2 Cellulosic Ethanol Initiative - From Pre-Commercial to Commercial Scale .....</b>	415
<i>Wortzman B.</i>	
<b>Impact of Sludge Acclimatization on Biological Hydrogen Production from Thin Stillage .....</b>	416
<i>Nasr N., Elbeshbishi E., Hafez H., Nakhla G., El Naggar M. H.</i>	

<b>Corn Bio-Refinery Pathway to Sustainability .....</b>	417
<i>Schwartz M.</i>	

## **BIO9 – OPHTHALMIC MATERIALS AND DRUG DELIVERY 2 (SPONSORED BY 20/20: NSERC'S OPHTHALMIC MATERIALS NETWORK)**

<b>Injectable Hydrogel for Cell Transplantation .....</b>	418
<i>Shoichet M., Ballios B., van der Kooy D.</i>	
<b>Stimuli-responsive Hydrogels from Polyglycerol.....</b>	419
<i>Dubé M.A., Salehpour S.</i>	
<b>Novel PH Sensitive Star Polymers with Hyperbranched Polyethylene Core Synthesized via the Combination of CWP and RAFT Polymerization .....</b>	420
<i>Dong Z., Ye Z.</i>	
<b>Silicone Polymers at Biological Interfaces .....</b>	421
<i>Sheardown H.D., Brook M.A., Liu L., Klenkler B.J., Weeks A.K., Submarran L.</i>	
<b>Design, Synthesis and Characterization of a Nanogel as a New Gd<sup>3+</sup> Contrast Agent Scaffold for Magnetic Resonance Imaging.....</b>	422
<i>Soleimani R., Martinez F.M., Bonduelle C.V., Scholl T.J., Gillies E.R.</i>	

## **BIO10 – BIOREACTOR DESIGN AND CONTROL**

<b>Mathematical Model of Growth and Acetone-Butanol-Ethanol (ABE) Production of the Anaerobic Clostridium acetobutylicum .....</b>	423
<i>Kilonzo P.M., Margaritis A., Bergougnou M.A.</i>	
<b>Bubble-free Oxygen Mass Transfer in Bioreactors by Using Microporous Membranes.....</b>	424
<i>Balgobin R., Karamanev D., Bassi A.</i>	
<b>Hydrophobic VOC Absorption in Water/Silicone Oil Mixtures: Application of the "Equivalent Absorption Capacity" Concept for Gas-Liquid-Liquid Contactor Design .....</b>	425
<i>Dumont E., Darracq G., Couvert A., Amrane A., Couriol C., Andrès Y., Thomas D., Le Cloirec P., Hamon L.</i>	
<b>Modeling Biomass Growth and Nitrogen Utilization During Toluene Biofiltration.....</b>	426
<i>Haque F., De Visscher A., Sen A.</i>	
<b>Numerical Simulation of Liquid-Solid Circulating Fluidized Beds Ion Exchange System for Continuous Protein Recovery .....</b>	427
<i>Dadashi A., Zhu J., Zhang C.</i>	

## **CAT4 – CHEMICAL KINETICS AND REACTION ENGINEERING 1**

<b>A Greener Process for Upgrading Oilsands Bitumen .....</b>	428
<i>Ng F.T.T., Jia L., Moll J.K., Liu K.</i>	
<b>Methane Catalytic Cracking in a Fluidized Bed .....</b>	429
<i>Amin A., Croiset E., Epling W.</i>	
<b>Azo-dye Orange II Degradation By Heterogeneous Fenton-like Reaction Using Zeolite Y-Fe Catalysts .....</b>	430
<i>Rache Rodríguez M.L., Ramírez Franco J.H.</i>	
<b>Development of a Green Separation Technique for the Recovery of Rhodium Based Catalysts from Bulk Hydrogenated Nitrile Butadiene Rubber (HNBR) .....</b>	431
<i>Yang L., Pan Q., Rempel G.L.</i>	
<b>Thermodynamic Analysis of Selective Ring Opening of Naphthenes .....</b>	432
<i>Kotikalapudi C.M., Govindhakannan J., Dalai A.K.</i>	
<b>Screening Catalyst Metals for Hydrodeoxygenation of Lignin Model Compounds in Super-critical Isopropyl Alcohol .....</b>	433
<i>Tymchyshyn M.A., Yuan Z., Berruti F., Xu C.</i>	
<b>Kinetic Analysis of the Exchange Process Between Sodium and Potassium Ions in Type A Zeolite .....</b>	434
<i>García Soto A.R., Rodríguez Niño G., Trujillo C.A.</i>	
<b>Catalytic Consequences of Chemisorbed Oxygen Atoms for Natural Gas Conversion on Group VIII Metal Clusters .....</b>	435
<i>Chin Y.-H., Garcia-Dieguez M., Buda C., Neurock M., Iglesia E.</i>	

## **ENR9 – FUEL CELLS – MEMBRANES AND GRAPHENE**

<b>Development of a Novel Swiss-Roll Mixed-Reactant Fuel Cell: Application for Direct Borohydride Fuel Cells .....</b>	436
<i>Aziznia A., Oloman C.W., Gyenge E.L.</i>	
<b>Anion Exchange Membrane for High Temperature Alkaline Fuel Cells.....</b>	437
<i>Zarrin H., Chen Z., Fowler M.</i>	
<b>Functionalized Graphene Oxide as a New Highly Proton Conductive Composite Membrane for PEMFCs at High Temperature and Low Humidity.....</b>	438
<i>Zarrin H., Jun Y., Fowler M., Chen Z.</i>	

<b>Synthesis and Application of Doped-graphene as Non-noble Electrocatalysts for Fuel Cells .....</b>	439
<i>Geng D., Sun S., Hu Y., Li R., Sun X., Ye S., Knights S.</i>	
<b>Chemical Functionalization of Graphene for Lithium Ion Batteries .....</b>	440
<i>Hu Y., Li R., Sun A.</i>	

## **ENR10 – FUEL CELLS AND THEIR FUEL**

<b>Modeling of Control Parameters of a Fuel Cell (Proton Exchange Membrane) Cooled By Air .....</b>	441
<i>Vanopper B., Arranz L., Barambones O., Merino J.M., Camarero L.M., Villota N.</i>	
<b>AD-Derived Biogas Variability and Use in Solid Oxide Fuel Cells in North America .....</b>	442
<i>Lackey J., Champagne P., Peppley B.A., Maier A.</i>	
<b>Thermodynamic Model Development of an Integrated AD-SOFC System for the Determination of Optimal Operating Conditions.....</b>	443
<i>Wartman T., Thurgood C., Champagne P., Peppley B., McAlary G.</i>	
<b>Study on Electrolysis of HI in the Bunsen Reaction Product Solution for H<sub>2</sub> Production.....</b>	444
<i>Zhao X., Wang H., Chuang K.T.</i>	
<b>Thermal Decomposition of Polydimethylsiloxanes on Activated Gamma Alumina .....</b>	445
<i>Sonoc A.C., Thurgood C., Peppley B.</i>	

## **ENR11 – SUPERCRITICAL PROCESSES AND HYDROGEN PRODUCTION**

<b>A Parametric Study on Gasification of Rice husk in Supercritical Water.....</b>	446
<i>Leon M., Mettanant V., Dutta A., Basu P.</i>	
<b>Gasification of Biomass to H<sub>2</sub> using Supercritical Water .....</b>	447
<i>Ding N., Surisetty V., Azargohar R., Dalai A., Kozinski J.</i>	
<b>Screening Catalyst Metals for Hydrodeoxygenation of Lignin Model Compounds in Super-critical Isopropyl Alcohol .....</b>	448
<i>Feng S., Yuan Z., Leitch M., Xu C.</i>	
<b>Towards the Stoichiometric Conversion of Biodiesel Derived Crude Glycerol to Hydrogen: Response Surface Methodology Study of the Effect of Light Intensity and the Concentration of Crude Glycerol and Glutamate .....</b>	449
<i>Ghosh D., Flore Sobro I., Hallenbeck P.C.</i>	

## **ENR12 – PRODUCTION AND USE OF GREEN CHEMICALS**

<b>Production of Aromatic-based Chemicals and Intermediary for Jet Fuel Synthesis Via Successive Steam Explosion of Lignocellulosic Biomass and Depolymerization of Lignin.....</b>	450
<i>Beauchet R., Lavoie J.M.</i>	
<b>Use of Hydroisomerization to Reduce the Melting Point of Palmitic Acid Methyl Ester.....</b>	451
<i>Reaume S.J., Ellis N.</i>	
<b>Making Fuel Pellets from Canola Meal and Raw Glycerol .....</b>	452
<i>Clarke T., Azargohar R., Dalai A.K., Kozinski J.A.</i>	
<b>Kinetic Study of Ethanolysis of Canola Oil in a Batch Reactor and Development of a Novel Method to Reduce the Mass Transfer Effects .....</b>	453
<i>Pal K.D., Prakash A.</i>	

## **ENV7 – CONTAMINATED SITES**

<b>Improving Risk Assessment Through the Incorporation of Bioaccessibility: A Science-based Framework for Arsenic .....</b>	454
<i>Reimer K.J., Koch I., Meunier L.</i>	
<b>The North Rankin Nickel Mine Site : Remote Sensing Spectral Analysis of Surface Cover Material.....</b>	455
<i>Lanthier Y., Bandler P.</i>	
<b>Anaerobic Biphenyl Degradation by Poplar and Willow Rhizosphere Microorganisms.....</b>	456
<i>Sun B., Ko K., Ramsay J.</i>	
<b>Phylogenetic and Functional Analysis on an Anaerobic Benzene-Degrading Community.....</b>	457
<i>Ho H.C., Beiko R., Devine C., Mahadevan R.</i>	
<b>Adapting KB-1 a Dechlorinating Enrichment Culture to Dechlorinate Acidic Contaminated Sites.....</b>	458
<i>Li Y.X., Edwards E.A.</i>	

## **ENV8 – INDUSTRIAL WASTEWATER TREATMENT TECHNOLOGIES 1**

<b>Removal and Recovery of Heavy Metals from Aqueous Solution for Green Environment: Biosorption of Different Heavy Metal Ions from Aqueous Solutions by "Gyralia oxysperma, Hypnea musciformis and Ulva prolifera".....</b>	459
<i>Gurbuz M.G., Erol M., Tezyetis S.</i>	
<b>Detection of Organic Matter and Silica Removal Efficiency in Evaporative and Acid Treatment Processes for Minimizing Disposal Water Volume During In-Situ Thermal Oil Recovery .....</b>	460
<i>Maiti A., Bhattacharjee S.</i>	

<b>Kinetics and Adsorption of Cr Ions from Aqueous Solution by Zeolite NaX and Its Sorption Properties.....</b>	461
<i>Singh S., Sambi S.S., Sharma S.K.</i>	
<b>The Role of Members of a Biofilm Consortium in the Biodegradation of Naphthenic Acids in an Immobilized Soil Bioreactor.....</b>	462
<i>Yue S., Tam C., Ramsay B., Ko K.</i>	

## **FN2 – TRANSPORT PROCESSES**

<b>Transport Phenomena in Two-phase Liquid-Liquid Microreactors: Simplified Designs of Micromixers .....</b>	463
<i>Plouffe P., Anthony R., Beaulieu P., Roberge D., Macchi A.</i>	
<b>Gas Adsorption Equilibrium and Water Vapor Transmission Rate of Cellulose Fiber Based Materials .....</b>	464
<i>Bedane A.H., Huang Q., Eic' M.</i>	
<b>Development of a New Optimized Correlation for Diffusion Coefficient in Gaseous Hydrocarbons.....</b>	465
<i>Jamshidnejad M., Sarafraz M., Hasanzade Y.</i>	
<b>Computer Fluid Dynamics of Pool Fire .....</b>	466
<i>Zarate L.G., Cordero M.E., Lara H.E., Cabrera M., Kozanoglu B.U.</i>	

## **FN3 – HEAT AND MASS TRANSFER**

<b>Natural Convection of a Non-Fourier Fluid Flow in a Vertical Slot and Application to Nanofluids .....</b>	467
<i>Niknami M., Khayat R.E.</i>	
<b>Retrofitting Heat Exchanger Networks Using A Modified Network Pinch Approach.....</b>	468
<i>Bakhtiari B., Bedard S.</i>	
<b>Characterization and Optimization of the Continuous-flow Mixing of Pseudoplastic Fluids Possessing Yield Stress in Stirred Reactors .....</b>	469
<i>Patel D., Ein-Mozaffari F., Mehrvar M.</i>	

## **MSE5 – POLYMERS IN NANOTECHNOLOGY 2**

<b>Self-Cleaning Polyurethane and Polyester Coatings .....</b>	470
<i>Tang Y., Wang L., Chowdhury R.R., Lotus A., Jenkins D., Therrien P., Charpentier P.A.</i>	
<b>Molecular Dynamics Study of the Diffusivity of Water in Polyurethane With and Without an Aptamer .....</b>	471
<i>Zhou D., Choi P.</i>	
<b>Fabrication and Characterization of Electrospun Chitosan-based Membranes for Heavy Metal Ions Removal from Drinking Water.....</b>	472
<i>Pakravan M., Heuzey M.-C., Ajji A., Barbeau B.</i>	
<b>Synthesis and Characterization of Thermoplastic Flexible Polyesters and Polyimides with pH Sensitive Dissipatability.....</b>	473
<i>Sacripante G., Foucher D.</i>	
<b>Advances in Polymer Nanocomposites: Thermoplastics, Clays and Nanocrystalline Cellulose .....</b>	474
<i>Simon L.</i>	
<b>Synthesis of Styrene Butadiene Rubber Nano Particles via Differential Emulsion Polymerization .....</b>	475
<i>Zou R., Pan Q., Rempel G.L.</i>	
<b>Thermally Induced Wrinkling Phenomena in Automotive Decorative Film Laminates - Paper Withdrawn.....</b>	476
<i>Pukadyil R.N., Nielsen K.E., Brandy F.A., Thompson M.R.</i>	

## **NNO5 – NANOMATERIALS IN BIOLOGICAL AND BIOMEDICAL ENGINEERING 2**

<b>Nanoscale Functionalities for Targeted Delivery of Biopharmaceutics .....</b>	477
<i>Kiparissides C., Kammona O.</i>	
<b>Study of Electrically Conductive Bacterial Nanowires .....</b>	478
<i>Leung K.M., Lau L., Southam G., Yang J.</i>	
<b>SiRNA Delivery using Poly(TMCC-co-LA)-g-PEG Micelles.....</b>	479
<i>Chan D., Shoichet M.S., Deleavy G.F., Damha M.J., Lu J., Owen S.C.</i>	
<b>Development of Multifunctional Magnetic Nanoparticles for Biomedical Applications.....</b>	480
<i>Chen L., Zhang J.</i>	

## **NNO6 – SYNTHESIS AND CHARACTERIZATION OF NANOMATERIALS**

<b>The Production of Nano-sized Titanium Dioxide Using a Transferred Arc Plasma Process: Synthesis, Characterization and Preliminary Economics .....</b>	481
<i>Munz R.J., Liao X., Wang J.</i>	
<b>Carbon Nanotubes and Graphene for Thermal Interface Materials .....</b>	482
<i>Yu A.</i>	
<b>Synthesis of Supported Silver Nano Particles as a Catalyst for CO Oxidation Reaction Using Gel Casting Technique .....</b>	483
<i>Ahmadi S., Kazemian H., Rohani S., Manteghian M.</i>	

<b>ALD Coating of CoO<sub>x</sub> and ZrO<sub>2</sub>.....</b>	484
<i>Liu J., Meng X., Li R., Sun X.</i>	
<b>Preparation of Stable Graphene Dispersion in Organic Solvents via Liquid Phase Noncovalent Exfoliation of Graphite with a Hyperbranched Polyethylene.....</b>	485
<i>McGraw J., Xu L., Ye Z.</i>	

## **PTF6 – COMPUTATIONAL FLUID DYNAMICS (CFD) AND ITS APPLICATIONS**

<b>CFD Simulations of the Hydrodynamics of Downer Flows with Combined EMMS/TFM Approach.....</b>	486
<i>Liu Y., Wang J., Ge W., Li J.</i>	
<b>Application of Computational Fluid Dynamics Simulation in Improving Fluidized Catalytic Cracking Technologies.....</b>	487
<i>Lan X.Y., Gao J.S., Xu C.M.</i>	
<b>Modelling of Spray Interactions in a Fluidized Bed.....</b>	488
<i>Pougatch K., Salcudean M., McMillan J.</i>	
<b>CFD Modeling-Galvanizing Bath .....</b>	489
<i>Akbarzadeh V., Hrymak A., Liu D.</i>	

## **PTF7 – APPLICATIONS IN PARTICLE RESEARCH**

<b>Ultrafine Powders: Researches and Applications at UWO .....</b>	490
<i>Zhang H., Zhu J.</i>	
<b>The Role of Mineral Fines in the Reclaiming of Oil Spills.....</b>	491
<i>Wang W.Z., Zheng Y., Li Z.K., Lee K.</i>	
<b>Graphene/Polyppyrrole Composite Film for Electrochemical Supercapacitor Electrode .....</b>	492
<i>Davies A., Yu A.</i>	

## **PSM4 – RISK CONTROL 2**

<b>Build Your Process Safety Engineering Experience.....</b>	493
<i>Wong D.</i>	
<b>Explosion Ventilation Design Sensitivities .....</b>	494
<i>Li I.H., Senez P.L., Calder K.D.</i>	
<b>Updates on the Minerva Summer Institute .....</b>	495
<i>Pasteris A.E., Norval G.W.</i>	
<b>Prestart Up Safety Review, An Important PSM Element.....</b>	496
<i>Lacoursiere J.-P.</i>	
<b>The 1<sup>st</sup> Amendment to the Environmental Emergency Regulations.....</b>	497
<i>Gratton D.</i>	

## **SNC3 – PLANT-WIDE AND DISTRIBUTED CONTROL SYSTEMS**

<b>Implementation of RTO Procedures in Real Chemical Processes .....</b>	498
<i>Pinto J.C., Quelhas A., Jesus N.J.</i>	
<b>A Safe-Parking Approach to Handle Partial Plant Shutdown.....</b>	499
<i>Aumi S., Du M., Mhaskar P.</i>	
<b>Model Predictive Control of Process Supply Chain Systems under Uncertainty .....</b>	500
<i>Mastragostino R., Swartz C.L.E.</i>	
<b>Automated Fast Feed Pull at an Olefins Plant .....</b>	501
<i>David S.</i>	

## **SNC4 – PROCESS CONTROL APPLICATIONS (GREEN TECHNOLOGIES, PARTICULATE SYSTEMS, PHARMACEUTICAL INDUSTRY, BIOCHEMICAL PROCESSES, ETC.)**

<b>Offset-Free Model Predictive Control of Vapor Compression Cycle .....</b>	502
<i>Wallace M., Aumi S., Mhaskar P., House J., Salsbury T.</i>	
<b>Multivariate Light-Induced Fluorescence (LIF) Spectroscopic Analyzer for the Quantitative Analysis of Pharmaceutical Powders .....</b>	503
<i>Guay J.-M., Abatzoglou N., Lapointe-Garant P.-P.</i>	
<b>Microbial Fuel Cell Periodic Operation.....</b>	504
<i>Grondin F., Perrier M., Tartakovsky B.</i>	
<b>Analysis of Sucker-Rod String Dynamics in Artificial Lift Systems for Control Applications.....</b>	505
<i>Ng J., Dubljevic S.</i>	
<b>Oil Production Optimization in Microalgae Bioreactor using Moving Horizon Estimator and Model Predictive Control.....</b>	506
<i>Abdollahi J., Dubljevic S.</i>	

## **IND2 – INNOVATION: IMPACT THROUGH TECHNOLOGY TRANSFER**

<b>Turning Waste Into Black Gold.....</b>	507
<i>Berruti F.</i>	
<b>Global Needs and Opportunities for Innovation in Wastewater Technologies and Services .....</b>	508
<i>Devries M.</i>	
<b>GreenCentre Canada - Bridging the Commercialization Gap.....</b>	509
<i>McLachlan J.A.</i>	
<b>Innovation in Water/Wastewater Treatment - Facing the Challenges of Starting Up a New Technology .....</b>	510
<i>Hughes A.</i>	
<b>Innovation in Industrial Processing Technology - The University Spinoff Company Route to Commercial Markets .....</b>	511
<i>Haas C.</i>	
<b>Innovation in Water/Wastewater Treatment Over 3 Decades - Have the Problems Changed? .....</b>	512
<i>Vander Laan H.</i>	
<b>Additional Electricity Needs from Ontario Power Plants for Charging Plug-in Hybrid Electric Vehicles .....</b>	513
<i>Ahmadi L., Croiset E., Elkamel A., Douglas P.L., Entchev E.</i>	

## **SRE4 – GREEN REACTION ENGINEERING 2**

<b>Catalytic Conversion of Naphthalenes: Activity and Selectivity of USY Zeolites.....</b>	514
<i>Al-Sabawi M., de Lasa H.</i>	
<b>Kinetic and Catalytic Performance of a Composite Bi-porous Material in Catalytic Cracking and Isomerization Reactions.....</b>	515
<i>Balasamy R.J., Odedairo T., Al-Khattaf S.</i>	
<b>Steam Gasification of a Cellulose Surrogate over a Fluidizable Ni/<math>\alpha</math>-Alumina Catalyst: A Kinetics Model.....</b>	516
<i>Salaices E., deLasa H., Serrano B.</i>	
<b>Hydrocarbon Desulfurization using ZSM-5 Zeolite Self Diffusivity of n-Dodecane and Benzothiophene using Molecular Dynamics Simulation.....</b>	517
<i>Al-Bogami S.A., Ferreira M.L., de Lasa H.I.</i>	
<b>Recycling Polyethylene Terephthalate (PET) through Thermal Degradation .....</b>	518
<i>Elordi G., Olazar M., Arandes J., de Lasa H.</i>	
<b>Kinetic Modeling of Selective Catalytic Reduction of NO<sub>x</sub> by Propylene over Fe/ZSM-5 .....</b>	519
<i>Cheng X., Bi X.</i>	

## **SRE5 – GREEN REACTION ENGINEERING 3**

<b>Synthesis and Characterization of FeTiO<sub>3</sub>/TiO<sub>2</sub> Photocatalysts .....</b>	520
<i>Moctezuma E., Torres-Martinez L., Zarazua E., Zermeno B., Leyva E.</i>	
<b>Titanium Dioxide Photocatalytic Degradation of Phenol with Fe<sup>3+</sup>, Fe<sup>2+</sup> And Cu<sup>2+</sup> Ions in the Photo Crec Water II Reactor.....</b>	521
<i>Serrano Rosales B., Morales Arellano P., Rojas Torres M.G., Hernandez Mazatan M.A., Vazquez Minjares J.L., Moreira del Rio J., de Lasa H.</i>	
<b>Photocatalytic Degradation of Pharmaceutical Compounds: The Metoprolol Case .....</b>	522
<i>Moctezuma E., López-Barragán M., Pinedo-Escobar A., Leyva E., Serrano-Rosales B.</i>	
<b>Kinetic Modeling and Parameter Estimation for the Photocatalytic Oxidation of Phenol in Water .....</b>	523
<i>Moreira J., Serrano-Rosales B., de Lasa H.</i>	
<b>Photocatalytic Degradation of Organic Pollutants in Air. Energy Efficiency Factors in a Photo-CREC Unit.....</b>	524
<i>Garcia Hernandez J., Serrano Rosales B., de Lasa H.</i>	

## **PL5 – PLENARY LECTURE-5**

<b>Women and Canada's Innovation Economy .....</b>	525
<i>Treurnicht I.</i>	

## **BIO11 – BIOMEDICAL ENGINEERING/TISSUE ENGINEERING 1**

<b>Development of an Efficient Serum-free Medium for Human Keratinocyte Proliferation .....</b>	526
<i>Debbah I., Duchesne C., Lemieux L., Germain L., Garnier A.</i>	
<b>Development of Suspension Bioreactor Protocols to Expand Populations of Adult Human Stem Cells from Synovial Fluid .....</b>	527
<i>Jorgenson K.D., Hart D.A., Frank C.B., Sen A.</i>	
<b>Oxygen Delivery Strategies in 3D Cell Seeded Tissue-engineered Scaffolds .....</b>	528
<i>Seifu D., Mequanint K.</i>	
<b>Clinical-scale Production of Human Mesenchymal Stem Cells in Computer-controlled Bioreactors using a Serum-free Medium .....</b>	529
<i>Panchalingam K.M., Jung S., Paramchuk W.J., Rosenberg L., Behie L.A.</i>	

<b>Proteomic Analysis and Long Term Live Cell Imaging of Primary Human Cells in Culture.....</b>	530
<i>Murray E., Droujinine I., Rosenberg L., Jervis E.</i>	
<b>Real-time Monitoring of Human Vascular Endothelial Cell Adhesion to Micropatterned Surfaces .....</b>	531
<i>Hoesli C., Boivin M.-C., Juneau P.-M., Tremblay C., Ruel J., Duchesne C., Laroche G., Garnier A.</i>	
<b>Co-culture of Smooth Muscle Cells and Endothelial Cells on 3D Porous Poly(carbonate urethane) Scaffolds for Vascular Tissue Engineering.....</b>	532
<i>Bhattacharyya A., Sandig M., Mequanint K.</i>	
<b>Use of DMSO as Pre-treatment for Pericardial Tissue to Reduce Calcification in Bioprosthetic Heart Valves.....</b>	533
<i>Parekh A., Wan W., Talman E.</i>	
<b>A Fusogenic Liposome Platform for Active Intracellular Delivery of siRNA .....</b>	534
<i>Lewis J.D.</i>	

## **BIO12 – MICROALGAE, PRODUCTION AND APPLICATIONS 1**

<b>Lipid Production in Chlamydomonas reinhardtii Cultured Under Heterotrophic Conditions .....</b>	535
<i>Sestruc R., James G., Hocart C.H., Djordjevic M., Levin D.B.</i>	
<b>Thermodynamic Assessment of Heterotrophic Algal Growth Processes .....</b>	536
<i>Volk A.J.A., McCaffrey W.C., Burrell R.B.</i>	
<b>Effect of Carbon Dioxide and Nitrate Concentration on Chlorella vulgaris Growth, Lipid Production and Cell Wall Composition Using Response Surface Methodology .....</b>	537
<i>Aguirre A., Bassi A.</i>	
<b>Production of Microalgae in a Continuous Tubular Photobioreactor .....</b>	538
<i>Sacasa C., Bassi A.</i>	
<b>Influence of the Plant Growth Regulators Kinetin, 6BA and NAA on Chlorella protothecoides Growth.....</b>	539
<i>Ubeda B.T., Burrell R.E., Burrell M., McCaffrey W.C.</i>	
<b>Investigation of Overall Mass Transfer Coefficients of Carbon Dioxide in a Stirred Tank Bioreactor for Microalgae Cultivation .....</b>	540
<i>Kazim A., Bassi A.</i>	
<b>Use of Industrial Off-gas Waste Energy to Heat Ponds for Year Round Microalgae Production in Cold Climates.....</b>	541
<i>Scott J.A., Loken M., Shang H., Salt B., Ross G.M.</i>	
<b>Microalgae For Treatment of Hydroponic Wastewater Effluent .....</b>	542
<i>Saxena P., Bassi A.</i>	

## **CAT5 – CHEMICAL KINETICS AND REACTION ENGINEERING 2**

<b>Time-Resolved XANES, EXAFS and PDF Studies on Metal Nanoparticle Growth of Ni-Based Catalysts for CO<sub>2</sub> Reforming of CH<sub>4</sub> .....</b>	543
<i>Wang H., Miller J.T., Wu T., Zhao H., Shakouri M., Akatay M.C.</i>	
<b>Comparative Kinetics of Transesterification for Biodiesel Production from Palm Oil and Mustard Oil.....</b>	544
<i>Issariyakul T., Dalai A.K.</i>	
<b>Axial Precious Metal Design in a Diesel Oxidation Catalyst for Improving CO Conversion Performance .....</b>	545
<i>Al-Adwani S., Epling W.</i>	
<b>Modeling of Microwave Irradiated Liquid- Liquid-Liquid Phase Transfer Catalyzed (MILL) Synthesis of Benzyl Thiocyanate .....</b>	546
<i>Yadav G.D., Sowbhag P.R.</i>	
<b>Characterizing Performance Characteristics of a Non-Precious Metal Lean NOX Trap Catalyst.....</b>	547
<i>Constantinou C., Epling W., Li W., Qi G., Allen M.</i>	

## **ENR13 – CHEMICAL LOOPING AND CO<sub>2</sub> STORAGE**

<b>Chemical Looping Gasification of Biomass .....</b>	548
<i>Acharya B., Dutta A., Basu P.</i>	
<b>Practical Sorbents for Ca Looping Technology .....</b>	549
<i>Ridha F., Manovic V., Macchi A., Anthony E.</i>	
<b>Hydrogen Production via Water Splitting over Fe-Cu Based Oxygen Carriers .....</b>	550
<i>Chiron F.-X., Patience G.S.</i>	
<b>CO<sub>2</sub> EOR Potential in Western Canada .....</b>	551
<i>Peachey B.R.</i>	
<b>Implementing Artificial Neural Networks to Predict the Performance of the CO<sub>2</sub> Sequestration in Coal Bed Methane Reservoirs.....</b>	552
<i>Mohammadpoor M., Torabi F.</i>	

## **ENR14 – PETROLEUM AND NATURAL GAS**

<b>Generalized Stoichiometry to Model Gas Phase Composition during Gasification of Complex Cokes .....</b>	553
<i>Maya-Yescas R., Jiménez-García G., Paniagua-Rodríguez J.C.</i>	

<b>Density and Molecular Weight Distribution of Asphaltenes from Native and Refined Crude Oils .....</b>	554
<i>Barrera D.M., Ortiz D.P., Yarranton H.W.</i>	
<b>New Insights into Gas Hydrate Decomposition in the Presence of Synthetic and Biological Inhibitors .....</b>	555
<i>Daraboina N., Englezos P., Ripmeester J.A., Walker V.K.</i>	
<b>Improving Reliability of Crude Furnace Air Preheater for Cold Climates through Engineering Design .....</b>	556
<i>Gollpudi B., Nichols D.</i>	
<b>Microbial Inhibition of Methane Clathrate Hydrates.....</b>	557
<i>Townson I.M., Englezos P., Ripmeester J.A., Walker V.K.</i>	
<b>Effect of Cooling Rate on the Wax Appearance Temperature of "Waxy" Mixtures.....</b>	558
<i>Kasumu A.S., Arumugam S., Mehrotra A.K.</i>	
<b>Studies in Delayed Coking of Arabian Mix Asphalt.....</b>	559
<i>Sawarkar A.N., Pandit A.B., Joshi J.B.</i>	

## **ENV9 – AIR POLLUTION MONITORING AND CONTROL SYSTEMS**

<b>Quantification of the NH<sub>3</sub> Adsorption on Dust and Its Consequences on the Design of Biofilters for the Removal of Aerial Pollutants in Piggeries .....</b>	560
<i>Hamon L., Lagadec S., Dumont E., Landrain B., Landrain P., Andrès Y.</i>	
<b>Air Phase Photochemical Destruction of Chlorobenzene .....</b>	561
<i>Sycz M., Zhang L., Anderson W.A.</i>	
<b>Photolytic versus Photocatalytic Degradation of Benzene in Waste Gas: A Modeling Study .....</b>	562
<i>Atyabi M., De Visscher A.</i>	
<b>CO<sub>2</sub> Capture Using Lithium Zirconate Based Adsorbents .....</b>	563
<i>Samanta A., Sarkar P., Yamarte L., Gupta R.</i>	
<b>Plume Raise from Flare Combustion Modeling Including Rate of Reaction .....</b>	564
<i>Rahnama K., DeVisscher A.</i>	
<b>CFD Simulation of Vehicle-induced Turbulence and Pollutant Transport.....</b>	565
<i>Kim Y., Jia C.Q., Gong S.</i>	
<b>Microbial Community Modeling and the Design of Effective Uranium Bioremediation Strategy .....</b>	566
<i>Zhuang K., Ma E., Mahadevan R.</i>	
<b>Mercury Removal by Modified Chabazite Based Halide Treatment .....</b>	567
<i>Ma J.J., Yao H., Xu M.H., Luo G.Q., Fang X., Zhang B., Xu Z.H.</i>	

## **FN4 – FLUID FLOW**

<b>Synergistic Effects of Surfactant and Polymer Types of Additives on Drag Reduction.....</b>	568
<i>Mohsenipour A.A., Pal R.</i>	
<b>Sensitivity Analysis of Closure Models in Turbulent Bubbly Flows.....</b>	569
<i>Mohajerani M., Mehrvar M., Ein-Mozaffari F.</i>	
<b>Analytical Bottom Stress Determination in Shallow Mine Tailings Pond .....</b>	570
<i>Faisal Md.M., Khayat R.E., Yanful E.K.</i>	
<b>Dynamic Performance of Continuous-Flow Mixing of Non-Newtonian Fluids in Stirred Reactors Using Close-Clearance Impellers.....</b>	571
<i>Patel D., Ein-Mozaffari F., Mehrvar M.</i>	
<b>Strategy for the Generation of a Non-equilibrium NT(P<sub>1</sub> P<sub>2</sub>) Ensemble in Molecular Dynamics Simulation.....</b>	572
<i>Huang C., Choi P., Kostiuk L.W.</i>	
<b>Applying Tomography and CFD to Evaluate the Mixing of Non-Newtonian Fluids with a Scaba 6SRGT Impeller.....</b>	573
<i>Pakzad L., Ein-Mozaffari F., Upadhyay S.R., Lohi A.</i>	
<b>Investigation of the Effect of the Central Impeller Type on the Mixing Performance of the Co-Axial Mixers through Tomography and CFD .....</b>	574
<i>Pakzad L., Ein-Mozaffari F., Upadhyay S.R., Lohi A.</i>	

## **FN5 – GAS SEPARATION**

<b>Separation of Carbon Dioxide and Nitrogen by Vacuum Swing Adsorption .....</b>	575
<i>Huang Q., Eic M.</i>	
<b>Effect of Nano NaX Zeolite on PES Membrane Using for Ethanol/Water Pervaporation Performance.....</b>	576
<i>Rabiee F., Aroujalian A., Raisi A., Fathizadeh M.</i>	
<b>Determination of Multi-Component Diffusivities in Gas-Polymer Systems .....</b>	577
<i>Sani A., Upadhyay S., Mozaffari F.</i>	
<b>MOFs as CO<sub>2</sub> Adsorbents in Pressure Swing Adsorption Processes.....</b>	578
<i>Hamon L., Pirngruber G.D.</i>	
<b>Gas Separation Properties of High-Flux Asymmetric Hollow Fiber Membranes: Some Important Aspects .....</b>	579
<i>Kundu P., Chakma A., Feng X.</i>	

## **MSE6 – POLYMERIZATION REACTION ENGINEERING 3**

A Kinetic Comparison Between Metallocene Catalyst Activated by Tetrakis(pentafluorophenyl) Borate and MAO for the Polymerization of Ethylene in a Semi-Batch Solution Reactor .....	580
<i>Brinen J.L., Mehdiabadi S., Soares J.B.P., Bilbao D.</i>	
Toward Understanding the Role of Crystallization and Dissolution Kinetics in Temperature Rising Elution Fractionation (TREF) of Ethylene/1-Olefin Copolymers.....	581
<i>Anantawaraskul S., Siriwongsarn E., Chokputtanawuttilerd N., Soares J.B.P.</i>	
Significance of Microstructure in Polyolefins Performance: Characterization Tools.....	582
<i>Monrabal B.</i>	
Polyolefins Characterization Techniques: A Comparison Between TREF, CRYSTAF, and CEF.....	583
<i>Alghyamah A.A., Soares J.B.P.</i>	
The Study of Olefin Polymerisation at Short Times: Gas and Solution Phase Studies Using Specially Adapted Reactors .....	584
<i>Tioni E., Monteil V., Ranieri E., Boisson C., McKenna T.</i>	

## **NNO7 – INTERFACE AND SURFACE AT NANO-SCALE**

"Surfadditive" Approach for Surface Modification of Plastic Parts in Molding/Casting and a "Cutting-edge" Technology for Preparation of Nanowaves and Nanowires.....	585
<i>Gu H., Zhu S.</i>	
Characterization of Covalent Immobilization of Proteins onto Surfaces via Sortase-mediated Ligation.....	586
<i>Latulippe D.R., Craighead H.G.</i>	
Adhesion and Failure Mechanisms of Nanoscale Thin Adhesive Films .....	587
<i>Zhao B.</i>	
A Completely New Application for Nanoparticles - Nanoparticle Flotation Collectors.....	588
<i>Yang S., Pelton R.</i>	
Effect of Temperature Gradient and Surface Potential on Morphology Evolution in Symmetric Polymer Blends.....	589
<i>Tabatabaiyazdi M., Chan P.K., Wu J.</i>	
Dielectrophoretic Assembly of Two- and Three-Dimensional Colloidal Structures.....	590
<i>Wood J.A., Docolis A.</i>	
Metal-Doped Carbon Nano-Filaments (CNF) for Gaseous Desulphurization .....	591
<i>Fauteux-Lefebvre C., Abatzoglou N.</i>	

## **PSM5 – RESIDUAL RISK MANAGEMENT**

Safety System Impairments and the Need to Manage Peak Risk .....	592
<i>Lewis D., Henselwood F.</i>	
Nexen Yemen Management of Organizational Change .....	593
<i>Waiss H.D., Burns J.H., Guss D.</i>	
The Mismanagement of Residual Risk: Why Risk Management Plans Often End in Failure .....	594
<i>Creedy G.D.</i>	

## **SNC5 – PROCESS AND PLANT OPTIMIZATION**

Scheduling Ethylene Plant Operation and Maintenance .....	595
<i>Pula R., Marlin T.E.</i>	
Decomposition Strategy for Global Optimization of Process Systems Under Uncertainty.....	596
<i>Li X., Chen Y., Tomasgard A., Barton P.I.</i>	
Data-Based Modeling and Control of Nylon-6,6 Batch Polymerization.....	597
<i>Aumi S., Corbett B., Mhaskar P., Clarke-Pringle T.L.</i>	
Deterministic Versus Stochastic Performance Assessment of Iterative Learning Control Loops .....	598
<i>Farasat E., Huang B.</i>	
Primary Steel Plant Modeling and Optimization .....	599
<i>Gerardi D.R., Swartz C., Marlin T.</i>	
Decision-Making Using Stochastic Linear Programming for Process Steam Distribution.....	600
<i>Weng W.F., Huang B., Forbes J.F.</i>	
Mg-silicate Processing for CO <sub>2</sub> Emissions' Mitigation: Process Integration Options .....	601
<i>Nduagu E.I., Zevenhoven R., Keith D.W.</i>	
Refinery Multi-unit Optimization.....	602
<i>Treibler S.S., McLeod R.S.</i>	

## **SRE6 – GREEN REACTION ENGINEERING 4**

Visualization of Flow Patterns in Micro-packed Bed Reactors.....	603
<i>Faridkhon A., Hamidipour M., Larachi F.</i>	

<b>Simulation of a Steam Coal Gasifier .....</b>	604
<i>Abbasi A., Ege P.E., de Lasa H.I.</i>	
<b>Extraction of Biocrude from Microalgae via Catalytic Hydrothermal Liquefaction in Subcritical Water and Characterizations of the Biocrude .....</b>	605
<i>Cheng S., Lan C.Q., Xu C.</i>	
<b>Detail Heat, Mass and Transport Study in Catalytic Plate Fuel Reformer using Microkinetics .....</b>	606
<i>Mundhwa M.A., Parmar R.D., Peppley B.A., Thurgood C.</i>	
<b>Selectivity Engineering of Solid Base Catalysed Selective O-Methylation of 2-Naphthol with Dimethyl Carbonate.....</b>	607
<i>Yadav G.D., Salunke J.Y.</i>	
<b>Catalytic Steam Gasification of Cellulose and Lignin Surrogates using Fluidizable Ni/La<sub>2</sub>O<sub>3</sub>-γAl<sub>2</sub>O<sub>3</sub> Catalyst.....</b>	608
<i>Mazumder J., Carrillo D., Lucky R., DeLasa H.I.</i>	
<b>Evaluation of Using Slurry of Coal in Bio-Liquid Fuels to Reduce Greenhouse Gas Emissions .....</b>	609
<i>Pisters K., Prakash A.</i>	
<b>Gas Phase and Surface Kinetics of Diesel Surrogate Reforming.....</b>	610
<i>Parmar R.D., Shekhawat D., Peppley B.A., Karan K.</i>	
<b>Near Isothermal Pyrolysis of n-Hexadecane in a Continuous Flow Reactor by Micro-mixing.....</b>	611
<i>Vafi K., Pfeifer P., McCaffrey W.C., Gray M.R.</i>	

#### **PL6 – PLENARY LECTURE-6**

<b>Learning from Data - The Engineer's Achilles' Heel .....</b>	612
<i>MacGregor J.</i>	

#### **BIO13 – BIOMEDICAL ENGINEERING/TISSUE ENGINEERING 2**

<b>BioProcessing of a Phase I Clinical Trial for the Treatment of Multiple Sclerosis (MS) Using a Stem Cell Based Therapy.....</b>	613
<i>Wuerth R.D., Gareau T., Wong T.W.C., Wong W., Behie L.A.</i>	
<b>Analysis of Asymmetric Environments of Soluble Factors for Single Cell Polarization.....</b>	614
<i>Verneau J., Averline A., Jervis E.J.</i>	
<b>Fractal Methods for Evaluating Growth and Differentiation of Embryonic Stem Cells in Static Culture Conditions.....</b>	615
<i>Hunt M., Gates I., Kallos M.</i>	
<b>Modeling the Effect of b-Myloid as a Direct Cholinergic Neuromodulator in Alzheimer's Disease Patients - Paper Withdrawn .....</b>	616
<i>Mustafa I., Chen Q., Elkamel A., Lohi A.</i>	
<b>A Synthetic Biology Approach to Bacteria Mediated Tumour Targeting .....</b>	617
<i>Zargar B., Ingalls B., Chen P.</i>	

#### **BIO14 – METABOLIC ENGINEERING AND BIOINFORMATICS**

<b>Effect of Expression of Copper-Zinc Superoxide Dismutase in Baculovirus-infected Insect Cells.....</b>	618
<i>Tuladhar A., Wagner A., George S., Aucoin M.G.</i>	
<b>Development of a Cellular Assay to Determine Toxicity and Carcinogenicity of Nickel Compounds .....</b>	619
<i>Renaud M., Nowruzi K., Hayward G., Dutton R.</i>	
<b>Microbial Genomics of Anaerobic Bacteria for Biofuel Production.....</b>	620
<i>Levin D.B., Sparling R.</i>	
<b>Modeling of Apoptosis in Chinese Hamster Ovary Cell Culture .....</b>	621
<i>Meshram M., Budman H., Scherer J., Ingalls B., McConkey B., Naderi S.</i>	
<b>Model-based Design of <i>Saccharomyces cerevisiae</i> for Improved Amino Acid Production .....</b>	622
<i>Cautha S., Mahadevan R.</i>	

#### **BIO15 – MICROALGAE, PRODUCTION AND APPLICATIONS 2**

<b>Microwave Assisted Direct Transesterification and Hydrolysis of Algal Biomass for Biofuel Production .....</b>	623
<i>Small D.P., Taha A., Wan W.K.</i>	
<b>Microalgae Milking with Microemulsions .....</b>	624
<i>Chan J., Chu C., Diosady L.L., Acosta E.J.</i>	
<b>Purification of Docosahexaenoic Acid by Selective Esterification of Fatty Acids from Tuna Fish Oil with Rhizopus oryzae Lipase.....</b>	625
<i>Bhandari K., Chaurasia S.P., Gupta A., Dalai A.K.</i>	
<b>Extracts of Phytoplankton Support Growth and Productivity of Recombinant CHO Cells .....</b>	626
<i>Spearman M.A., Jung V., Liu B., Butler M.</i>	
<b>The Development of Mixed Algal Biofilms for Biofilm Based Bioreactors.....</b>	627
<i>Schnurr P.J., Irving T., Espie G., Allen D.G.</i>	

## **BIO16 – SEPARATION AND DOWNSTREAM PROCESSING**

<b>Adsorptive Chromatographic Refolding of Proteins.....</b>	628
<i>Kaur H., Bassi A.</i>	
<b>Effect of Palmitic Acid on Association Behaviour of b-Lactoglobulin .....</b>	629
<i>Ignagni N.Z., Legge R.L.</i>	
<b>Factors Minimizing Emulsion Stability During Aqueous Extraction of Dehulled Yellow Mustard Flour .....</b>	630
<i>Tabatabaei S., Diosady L.L.</i>	
<b>Adsorptive Refolding and Purification of GST-His<sub>6</sub> Recombinant Protein Using Immobilized Metal Affinity Chromatography .....</b>	631
<i>Alassuity A.S., Bassi A., Zhu J.</i>	

## **CAT6 – MULTIPHASE REACTIONS & REACTOR SYSTEMS**

<b>Hydrotreating of Middle Distillates Fractionated from Bitumen-Derived Synthetic Crude Oil.....</b>	632
<i>Seki H., Yoshida M.</i>	
<b>NO Oxidation Inhibition by Hydrocarbons over a Diesel Oxidation Catalyst - Reaction between Surface Nitrates and Hydrocarbons .....</b>	633
<i>Oh H., Luo J., Epling W.</i>	
<b>Simulating Passive SCR over CuZeolite Catalyst with Spaci-FTIR Technique.....</b>	634
<i>Hou X., Epling W. S., Schmieg S. J., Li W.</i>	
<b>Effective Diffusion Coefficient Estimation and Its Effect on Isotherm Effectiveness Factor for HDS Catalytic Process: Multy-scale Approach.....</b>	635
<i>Cordero M.E., Zarate L.G., Salas J., Rangel R.N.</i>	
<b>Catalytic Conversion of Pyrolysis Gases - Paper Withdrawn.....</b>	636
<i>Shamaei L., Klerk A. de.</i>	

## **CEE1 – PERSPECTIVES IN UNDERGRADUATE EDUCATION**

<b>Design Implementation in Modern Chemical Engineering Teaching and Research.....</b>	637
<i>Lim C.J.</i>	
<b>The Heated Tank Laboratory for Teaching Control to Undergraduates: A Structured Approach and Some Observations.....</b>	638
<i>Shardt Y.A.W., Prasad V., Huang B.</i>	
<b>A North American Rare Earth Separation Plant: The Largest Outside China .....</b>	639
<i>Marchbank A.</i>	
<b>Chemical Engineering Education in the 21st Century for a Globalized Environment .....</b>	640
<i>Braig A.</i>	
<b>Rare Earth Processing is more than Metallurgy, It's Chemical Engineering! .....</b>	641
<i>Goode J.R., Verbaan N.</i>	
<b>Rare Earths, CleanTech and Human Resources .....</b>	642
<i>London I.M., Rayat M.S.</i>	
<b>Encouraging MATLAB Use, Standard Problem-Solving Skills, and Cross-Course Learning in First-Year Chemical Engineering Students .....</b>	643
<i>Corner L., Ricardez-Sandoval L.A., Robinson M.A., Legge R.L.</i>	

## **ENR15 – COAL AND CO-FEED COMBUSTION**

<b>Froth Phase Study of Coal Flotation in a Mechanical Flotation Column .....</b>	644
<i>Wang H., Cao M., Sztuke J.C., Stradling A., Xu Z., Liu Q.</i>	
<b>Influence of Pressure on CO<sub>2</sub> Gasification of Petroleum Coke .....</b>	645
<i>Malekshahian M., Hill J.M.</i>	
<b>Influence of Feed Size on Air Dense Medium Fluidized Bed Separator Performance .....</b>	646
<i>Mohanta S., Daram A.B., Chakraborty S., Meikap B.C.</i>	
<b>Torrefaction of BC Softwoods .....</b>	647
<i>Boyd T., Kempthorne H., Lee G., Ghiasi B., Sokhansanj S.</i>	
<b>Studying Kinetics and Mechanism of Catalytic Coal Gasification Reactions in Fluidized-Bed-TGA.....</b>	648
<i>Samith S., Jaafari R., Chaouki J.</i>	

## **ENR16 – SOLAR ENERGY**

<b>Photocatalytic Degradation of Formaldehyde and Simultaneous Hydrogen Production Using Pt/TiO<sub>2</sub> .....</b>	649
<i>Malekshoar Gh., Chowdhury P., Ray M.B., Zhu J., Ray A.K.</i>	
<b>Long Term Solar Energy Storage in Adsorbent Beds.....</b>	650
<i>Tezel F.H., Stephens S.</i>	

<b>Inherently Bipolar and Highly Absorbing Boronsubphthalocyanines as Functional Layers in Organic Photovoltaics.....</b>	651
<i>Bender T.P., Morse G., Castrucci J., Paton A.</i>	
<b>Fabrication of TiO<sub>2</sub> Blocking Layer for Solid-electrolyte Dye-sensitized Solar Cells .....</b>	652
<i>Li Y., Jiang C.Y., Leung M.Y., Koh W.L.</i>	
<b>Behaviour of Dye-sensitized Photocatalyst Under Visible and Solar Radiation - A Comparative Study for Hydrogen Generation.....</b>	653
<i>Chowdhury P., Gomaa H., Ray A.K.</i>	

## **ENR17 – SHALE GASE**

<b>Multiscale Probabilistic Mass Transport in Shallow Organic Matter Rich Shales .....</b>	654
<i>Cokar M., Kallas M.S., Gates I.D.</i>	
<b>Offsetting the Greenhouse Gas Footprint of Shale Gas by CCS.....</b>	655
<i>Wang J., Ryan D., Anthony E.J.</i>	
<b>Strategies for Low Temperature Bitumen Pyrolysis .....</b>	656
<i>Toosi E., De Clerk A., McCaffey W.</i>	

## **ENV10 – INDUSTRIAL WASTEWATER TREATMENT TECHNOLOGIES 2**

<b>Effects of Temperature and Temperature Shock on Cake Layer Structure and Membrane Fouling in a Submerged Anaerobic Membrane Bioreactor .....</b>	657
<i>Gao W.J., Leung K.T., Liao B.Q.</i>	
<b>Adsorption of Polycyclic Aromatic Hydrocarbons (PAHs) from Industrial Wastewater by Petroleum Coke-derived Activated Carbon.....</b>	658
<i>Awoyemi A.O., Jia C.Q.</i>	
<b>Adsorption Properties of Dimethylarsinic Acid on Iron (oxyhydr)oxides for Design of Arsenic Removal Technologies.....</b>	659
<i>Al-Abadleh H.A., Tofan-Lazar J., Adamescu A., Goldberg S.</i>	
<b>Analytical Bottom Stress Determination in Shallow Mine Tailings Pond .....</b>	660
<i>Faisal Md.M., Khayat R.E., Yanful E.K.</i>	
<b>Biosorption Process for Simultaneous Removal of Coexistent Heavy Metals from Aqueous Solutions.....</b>	661
<i>Amirnia S., Margaritis A., Ray M.</i>	
<b>BioWin Modeling to Simulate the Impact of Thermo-Chemical Pretreatment of Sludge on Enhanced Anaerobic Digestion .....</b>	662
<i>Dhar B.R., Elbeshbishi E., Hafez H., Nakhla G., Ray M.</i>	
<b>Fuzzy-Logic in Screening Saline Aquifers for CO<sub>2</sub> Sequestration.....</b>	663
<i>Zendehboudi S., Shafiei A., Elkamel A., Dusseault M.B., Chatzis I.</i>	
<b>Ultrasound Assisted Thermal Pretreatment Prior to Anaerobic Digestion of Sludge.....</b>	664
<i>Dhar B.R., Nakhla G., Ray M.</i>	

## **FN6 – SEPARATION PROCESSES**

<b>Recovery of Cupric Chloride from Electrolysis Effluent by Cooling and Antisolvent Crystallization .....</b>	665
<i>Daggupati V.N., Naterer G.F., Gabriel K.S., Wang Z.L.</i>	
<b>Separation of Solids in a Hydrocyclone with Spiral Internals .....</b>	666
<i>Kumar V., Chakraborty S., Meikap B.C.</i>	
<b>Floc Properties of Precipitated Calcium Carbonate Induced by Cationic Starch and Its Effect on the Retention and Dewaterability of Pulp Suspension .....</b>	667
<i>Sang Y., Englezos P.</i>	
<b>Optimization of Process Variables for a Lab Scale Copper Cementation Reaction using Design of Experiments.....</b>	668
<i>Nazim M., Pal P., Elkamel A., AlShoabi A.S., Dutta B.K.</i>	

## **MSE7 – COMPOSITE AND HYBRID MATERIALS 2**

<b>De-Polymerization of Lignin with Formic Acid in Sub-/Supercritical Solvent of 50% Aqueous Ethanol .....</b>	669
<i>Cheng S., Wang M., Yuan Z., Leitch M., Xu C.</i>	
<b>Novel Use of Ultraviolet Irradiation to Improve the Thermal Stability of Wheat Straw Fiber for Thermoplastic Composites Applications.....</b>	670
<i>Vedov D., Tsui T., Simon L.</i>	
<b>Kinetics &amp; Modeling of Homopolymerization and Copolymerization of Water-Soluble Monomers .....</b>	671
<i>Santana Krishnan S., Hutchinson R.A., Stach M., Lacik I.</i>	
<b>Response Surface Models for Optimization of Polypropylene-Wheat Straw Formulations.....</b>	672
<i>Rois F., Elkamel A., Simon L.</i>	
<b>Carbon Aerogels for Solar Thermal Applications .....</b>	673
<i>Gribbon J., Charpentier P.</i>	

<b>Rheological Studies on Plastic Foam Processing.....</b>	674
<i>Emami M., Vlachopoulos J., Thompson M., Takacs E.</i>	
<b>Thermoplastic Reinforced With Cellulosic Nanocrystal Derived From Potato Pulp .....</b>	675
<i>Chen D., Thompson M.R.</i>	
<b>Soy-Polypropylene Biocomposites for Automotive Applications.....</b>	676
<i>Guetter B., Moresoli C., Simon L.</i>	
<b>Comparison of Mica, Talc, Wollastonite and Wheat Straw on the Mechanical Properties of Polypropylene (Homopolymer, Copolymer and Blend).....</b>	677
<i>Sharma A.M., Simon L.C.</i>	
<b>Light and Heat Selective Nanocomposite Polymer Films for Greenhouses.....</b>	678
<i>Allan J., Abdul M., Charpentier P.</i>	

## **NNO8 – FUNCTIONAL NANOCOMPOSITES/NANOCRYSTALS**

<b>Durability and Homogeneity of Surface Chemistry Modifications on the Nanoscale .....</b>	N/A
<i>Gates B.D., Gong Y.Y., Pekcevik I., Mahmoudi M.S., Paul M., Ng H.W., Wang M.C.P.</i>	
<b>Application of Acoustic Techniques for the Production of Nanoscale Particles .....</b>	679
<i>Faucher S., Toth A., Wu Y.</i>	
<b>Use of Co-Solvents to Tune Zeolite Morphology .....</b>	680
<i>Gaona-Gomez A., Cheng C.-H.</i>	
<b>Converting Demetallization Products into Ultradispersed Nanocatalysts in Heavy Oil .....</b>	681
<i>Abdrabo A.E., Husein M.M.</i>	
<b>Regio- and Stereo-selective Polymerization of Dienes by Rare-earth Metal Precursors.....</b>	682
<i>Cui D.</i>	
<b>Molecular Assembly/Crystal Engineering of Boronsubphthalocyanine for Organic Electronic Applications. ....</b>	683
<i>Bender T.P., Virdo J., Brisson E., Paton A.</i>	
<b>Biocellulose Nanofibers Production from Agricultural Wastes .....</b>	684
<i>Al-Abdallah W., Dahman Y.</i>	

## **PTF8 – MULTIPHASE FLOW AND PARTICLE PROCESSING**

<b>New Developments in CFB Reactor Design.....</b>	N/A
<i>Anthony E.J.</i>	
<b>Development of a Non-Invasive, Acoustic Emissions Method to Measuring Solids Mass Flux.....</b>	686
<i>Kahn D., Ellis N., Lim C.J.</i>	
<b>Natural Convection of a Non-Fourier Fluid Flow in a Vertical Slot and Application to Nanofluids - Paper Withdrawn .....</b>	687
<i>Niknami M., Khayat R.E.</i>	
<b>Local Heat Transfer and Hydrodynamics in a Slurry Bubble Column: Effects of Sparger Type and Slurry Concentration.....</b>	688
<i>Jhawar A.K., Prakash A.</i>	
<b>Rayleigh-Benard Convection of Nanofluids, Part II - Nonlinear Analysis .....</b>	689
<i>Stranges D.F., Khorasany R.H., Khayat R.E.</i>	
<b>Modeling and Optimization of the Polymorphic Transformation Process using the Novel MOMC Method .....</b>	690
<i>Sheikholeslamzadeh E., Rohani S.</i>	
<b>Axial and Radial Composition Profiles in Flowing Particulate Mixtures.....</b>	691
<i>Abatzoglou N., Castellanos-Gil E., Gosselin R.</i>	
<b>The Effects of Different Factors on Material Utilization Efficiency of Powder Coating.....</b>	692
<i>Fu J., Zhang H., Zhu J.</i>	

## **SNC6 – MODELING AND SIMULATION**

<b>Determination of Adsorption and Kinetic Parameters for Biodiesel Transesterification Reaction Catalyzed by Amberlyst 15 .....</b>	693
<i>Mitra Ray N., Ray A.K.</i>	
<b>Chiral Separation by Coupling Simulated Moving Bed and Direct Crystallization .....</b>	694
<i>Mao S., Rohani S., Ray A.K.</i>	
<b>Modelling and Optimization of Methane Steam Reforming Reactor with Uncertain Parameters using Bayesian Network .....</b>	695
<i>Ohadi S.K., Jalali Farahani F.</i>	
<b>Simulation of Gas Sweetening Process Using Mixed Solvents of MDEA and Piperazine .....</b>	696
<i>Li H., Pan S., Zhu J., Zhang D.</i>	
<b>On the Numerical Robustness of Differential-Algebraic Distillation Models.....</b>	697
<i>Washington I., Swartz C.L.E.</i>	
<b>Ultraviolet Disinfection of Liquid Foods in a Taylor-Couette Reactor. Part I: Assessment of Photoreaction Efficiency by Passive and Reactive Tracer Tests .....</b>	698
<i>Shaunak R., Crapulli F., Santoro D., Patras A., Chan P., Ray A.K.</i>	

<b>Ultraviolet Disinfection of Liquid Foods in a Taylor-Couette Reactor. Part II: Numerical Analysis of Transport Phenomena and UV Dose Distribution .....</b>	699
<i>Crapulli F., Santoro D., Mahmoud H., Peng B., Sasges M., Ray A.K.</i>	
<b>Recursive Subspace Identification With Prior Information Using the Constraint Least Square (CLS) Approach .....</b>	700
<i>Alenany A., Shang H.</i>	
<b>Combining Process Knowledge and Data Analysis for Capturing Process Topology and Causality in Industrial Processes .....</b>	701
<i>Yang F., Shah S.L., Chen T., Xiao D.</i>	
<b>Thermodynamic Modeling and Experimental Study of Solubility of the Chemical and Pharmaceutical Compounds .....</b>	702
<i>Sheikholeslamzadeh E., Rohani S.</i>	
<b>Graphene: Synthesis and Application in Fuel Cells .....</b>	N/A
<i>Geng D., Hu Y., Li X., Li R., Sun X</i>	
<b>Nanomaterials for Energy Conversion and Storage.....</b>	N/A
<i>Sun S., Li X., Wang J., Li Y., Wang D., Liu J., Chen Y., Sun X.</i>	
<b>Circulating Fluidized bed bioreactor (CFBBR) Biofilm Model Used for Biological Wastewater Treatment .....</b>	705
<i>Eldyasti A., Nakhla G., Zhu J.</i>	
<b>Investigations of Heat Transfer in Gas-Solid Fluidized Beds.....</b>	N/A
<i>Pisters K., Prakash A</i>	
<b>Atomic Layer Deposition of Crystalline/Amorphous Cobalt Oxide on Nitrogen-doped Carbon Nanotubes and Application in Lithium Ion Batteries .....</b>	N/A
<i>Liu J., Meng X., Li X., Banis M.N., Li R., Sun X.</i>	
<b>Functional Antibacterial Surfaces Made by Ultrafine Powder Coating .....</b>	N/A
<i>Yeasmin R., Zhang H., Zhu J.</i>	
<b>The Role of Mineral Fines in the Reclaiming of Oil Spills.....</b>	709
<i>Wang W.Z., Zheng Y., Li Z.K., Lee K.</i>	
<b>The Effects of Different Factors on Material Utilization Efficiency of Powder Coating.....</b>	711
<i>Fu J., Zhang H., Zhu J.</i>	
<b>Pushing the Envelope: Novel Methodologies for the Preparation of Translucent Nanolatexes .....</b>	712
<i>Smeets N.M.B., McKenna T.F.L.</i>	
<b>Reactive Polyhydroxyalkanoates: A Sustainable Alternative for the Preparation of Polymer Hybrid Materials.....</b>	713
<i>Moraes R.P., Smeets N.M.B., McKenzie N., Zhang Y., Kontopoulou M., Ramsay B., Ramsay J.A., McKenna T.F.L.</i>	
<b>Microwave-Assisted Method for the Synthesis of Assimetrical Fluoroazobenzenes.....</b>	714
<i>Fonseca C., Leyva E., Moctezuma E.</i>	
<b>Author Index</b>	