

# **International Congress on Energy 2016 (ICE)**

Topical Conference at the 2016 AIChE Annual Meeting

San Francisco, California, USA  
13 - 18 November 2016

Volume 1 of 2

ISBN: 978-1-5108-3420-0

**Printed from e-media with permission by:**

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



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

Copyright© (2016) by AIChE  
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact AIChE  
at the address below.

AIChE  
120 Wall Street, FL 23  
New York, NY 10005-4020

Phone: (800) 242-4363  
Fax: (203) 775-5177

[www.aiche.org](http://www.aiche.org)

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

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

# TABLE OF CONTENTS

## VOLUME 1

<b>(23a) Control of Fe-Ni Nanoparticle Activity for the Oxygen Evolution Reaction (OER) and Methanol Electrooxidation</b> .....	1
<i>Stephanie Candelaria, Nikki S. Rentz, Lauren F. Greenlee</i>	
<b>(23b) Transition Metal-Nitrogen-Carbon Electrocatalysts for Oxygen Reduction Reaction</b> .....	2
<i>Plamen Atanassov, Kateryna Artyushkova, Alexey Serov, Ivana Matanovic</i>	
<b>(23c) Electrocatalytic Generation of H<sub>2</sub>O<sub>2</sub>: Carbon Based Material Synthesis and Device Design for Portable Low Cost Water Purification</b> .....	3
<i>Zhihua Chen, Shucheng Chen, Samira Siahrostami, Zhenan Bao, Jens Nørskov, Thomas F. Jaramillo</i>	
<b>(23f) Niobium Doped Molybdenum Disulfide Catalyst for CO<sub>2</sub> Reduction Reaction</b> .....	4
<i>Pedram Abbasi, Mohammad Asadi, Baharak Sayahpour, Amin Salehi-Khojin</i>	
<b>(25a) Reutilization of Coal Fly Ash for the Production of Highly Beneficial Products</b> .....	5
<i>Thawatchai Maneerung, Pengwei Dong, Siew Wah Ho, Sulenni Irawaty, Sibudjing Kawi, Koon Gee Neoh, Chi-Hwa Wang</i>	
<b>(25b) Characterizing Catalytic Waste Gasification - Effects of Substrate and Catalyst</b> .....	6
<i>Stephen A. Reeves, Eric M. Lange, Jade Moten, Aliandra D. Barbutti, Jorge E. Gatica</i>	
<b>(25c) Experimental and Numerical Study on Combining Anaerobic Digestion and Gasification for Potential Energy Recovery from Biomass and Sewage Sludge</b> .....	7
<i>Zhiyi Yao, Wangliang Li, Xiang Kan, Yanjun Dai, Yen Wah Tong, Chi-Hwa Wang</i>	
<b>(25d) Hydrothermal Carbonization of Organic Fraction of Municipal Solid Waste and Corresponding Digestate Via Anaerobically Digestion</b> .....	8
<i>M. Toufiq Reza, Charles Coronella, Kevin Holtman, Diana Franqui-Villanueva, Simon Poulson</i>	
<b>(25e) Minimizing Municipal Solid Waste Accumulation through the Application of Appropriate Technology</b> .....	9
<i>Chandni Joshi, Jeffrey R. Seay, Ph.D., P.E.</i>	
<b>(25f) Struvite Precipitation for Nitrogen Removal in Horse Manure for Gasification: Experimental Study and Economic Analysis</b> .....	10
<i>Ye Shen, Clive Chong, Wende Xiao, Chi-Hwa Wang</i>	
<b>(25g) Highly Selective Conversion of Biogenic Waste Materials to "Biogenic Formic Acid" As a Green Platform Chemical</b> .....	11
<i>Jakob Albert, Peter Wasserscheid</i>	
<b>(27a) Systematic Framework for Carbon Dioxide Capture and Utilization Processes to Reduce the Global Carbon Dioxide Emissions</b> .....	24
<i>Rebecca Frauzem, Cristina Calvera Plaza, Rafiqul Gani</i>	
<b>(27b) Design of Energy Saving CO<sub>2</sub> Separation Process Using Circulating Fluidized Bed</b> .....	26
<i>Yasuki Kansha, Masanori Ishizuka, Hiroyuki Mizuno, Atsushi Tsutsumi</i>	
<b>(27c) Systems Design and Economic Analysis of Direct Air Capture of CO<sub>2</sub> through Temperature Vacuum Swing Adsorption on Metal Organic Frameworks</b> .....	27
<i>Anshuman Sinha, Lalit A. Darunte, Christopher W. Jones, Yoshiaki Kawajiri, Matthew Realf</i>	
<b>(27d) New Performance Indicators for Adsorbents Used in CO<sub>2</sub> Capture Swing Adsorption Processes</b> .....	28
<i>Seongbin Ga, Hong Jang, Jay H. Lee</i>	
<b>(27e) Optimal Retrofit of a Post Combustion CO<sub>2</sub> Capture Process Using Reduced Superstructure and Rate-Based Models</b> .....	29
<i>Ung Lee, Alexander Mitsos, Chonghun Han, Changsoo Kim</i>	
<b>(27f) Dynamic Modeling with Uncertainty Quantification of Solid Sorbent Based CO<sub>2</sub> Capture Processes</b> .....	30
<i>Anca Ostace, Debansu Bhattacharyya, Keenan Kocan, David Mebane</i>	
<b>(27g) CO<sub>2</sub> Capture and Conversion to Chemicals Via Syngas: Rigorous Modeling, Intensification, and Superstructure-Based Process Synthesis</b> .....	31
<i>Priyadarshini Balasubramanian, Ishan Bajaj, M. M. Faruque Hasan</i>	
<b>(35a) Techno-Economic and Life Cycle Analysis of Chemical Production from Biomass Feedstocks</b> .....	32
<i>Abhay Athaley, Marianthi Ierapertritou, Praneeth Annam, Basudeb Saha</i>	
<b>(35b) Carbon Footprint Analysis of Biomethane from Anaerobic Digestion of a Food Waste / Manure Mixture in Colorado</b> .....	34
<i>Sharath Ankathi, David R. Shonnard, Jim Potter</i>	
<b>(35c) Multistage Torrefaction of Biomass and in Situ Catalytic Upgrading to Hydrocarbon Biofuels and Specialty Biochemicals</b> .....	35
<i>George G. Zaimes, Andrew Beck, Daniel E. Resasco, Steven Crossley, Lance Lobban, Vikas Khanna</i>	

<b>(35d) Optimizing Land Use Change and Life Cycle Greenhouse Gas Emissions of Biofuels</b> .....	36
<i>Daniel Garcia, Fengqi You</i>	
<b>(35e) Developing a Systemic Methodological Framework for the Sustainability Assessment of Biobased Fuels and Chemicals</b> .....	38
<i>Paraskevi Karka, Stavros Papadokostantakis, Antonis C. Kokossis</i>	
<b>(35f) Assessing Sustainability By Life Cycle Assessment Versus Techno-Ecological Synergy: A Case Study for Biofuel Production</b> .....	39
<i>Xinyu Liu, Bhavik R. Bakshi</i>	
<b>(40a) Engineering Macroscale Thermoelectric Transport By Chemical Modulation of Nanoscale Interfaces</b> .....	40
<i>Jeffrey Urban</i>	
<b>(40b) Doped Semiconducting Polymers As Solution-Processable Thermoelectric Materials</b> .....	41
<i>Shrayesh N. Patel, Anne M. Glaudell, Michael L. Chabinyc</i>	
<b>(40c) Thermal and Thermoelectric Transport Coefficients in Graphene</b> .....	42
<i>Enrique Munoz</i>	
<b>(40d) Carrier Scattering at Alloy Nanointerfaces Enhances Power Factor in PEDOT:PSS Hybrid Thermoelectrics</b> .....	43
<i>Edmond W. Zaia, Ayaskanta Sahu, Preston Zhou, Madeleine P. Gordon, Jason Forster, Shaul Aloni, Yi-Sheng Liu, Jinghua Guo, Jeffrey Urban</i>	
<b>(40e) Combining Density Functional Theory Calculations, Supercomputing, and Data-Driven Methods to Design New Thermoelectric Materials</b> .....	44
<i>Anubhav Jain, Umut Aydemir, Hong Zhu, Jan Pohls, Zachary Gibbs, Wei Chen, Saneyuki Ohno, Geoffroy Hautier, Gerbrand Ceder, Kristin Persson, Mary Anne White, G. Jeffrey Snyder</i>	
<b>(40f) Phase Diagram, Microstructure and Thermoelectric Properties</b> .....	45
<i>Sinn-wen Chen, Shi-Ting Lu, Hsin-jay Wu, Jui-shen Chang</i>	
<b>(40g) Shaping the Spectrum of Thermal Radiation Using Nanostructured Materials for Efficient Thermophotovoltaic Power Generation</b> .....	46
<i>Andrej Lenert</i>	
<b>(47a) Enzymatic Production of Fructo-Oligosaccharides from Inexpensive and Abundant Substrates Using a Membrane Reactor System</b> .....	47
<i>Peter Czermak, Amad Ur Rehman, Mehrdad Ebrahimi</i>	
<b>(47b) Consolidated Process for Biobutanol Production from Cellulose By Two Step Fermentation of Different Clostridia Strains</b> .....	48
<i>Jingbo Zhao, Shang-Tian Yang</i>	
<b>(47c) Bioprocess Development for Pleuran Production By Pleurotus Ostreatus Using Submerged Cultivation System in Semi-Industrial Scale</b> .....	49
<i>Hesham Ali El-Enshasy, Mohamed Helmi Johari Masri, Nor Zalina Othman, Roslinda Abd Malek, Ong Mei Leng, Ramlan Aziz</i>	
<b>(47d) Process Engineering of Clostridium Cellulovorans for Butanol Production from Biomass</b> .....	57
<i>Jianfa Ou, Chao Ma, Margaret Liu</i>	
<b>(47e) Ethanol Production on Date Syrup Using Yeast: Process Optimization Study for Pilot Scale Production</b> .....	58
<i>Kawther Salim Al-Aamri, Avnish Pareek, Hesham EL Enshasy</i>	
<b>(47f) Bioprocess Strategies to Optimize Thermostable Phytase Production By Escherichia coli B121 (DE3) When Induced with Lactose</b> .....	59
<i>Nor Zalina Othman, Roslinda Abd Malek, Solleh Ramli, Thi Thuy Tran, Mohamad Roji Sarmidi, Rajni Hatti-Kaul, Hesham EL Enshasy</i>	
<b>(47g) Laccase: Fermentation Process Intensification and Efficient Purification By Magnetic Separation</b> .....	66
<i>Chunzhao Liu</i>	
<b>(47h) A Biosensor for Human Milk Oligosaccharide Detection</b> .....	67
<i>Thomas J. Mansell, Fatima Enam</i>	
<b>(48a) Compositional Effect of Varying Feedstocks on Heavy Oil Upgrading By Supercritical Water</b> .....	68
<i>Ramazan Oguz Cantaz, Can Erkey, Serhat Arca</i>	
<b>(48b) Product Formation and Kinetics of the Non-Isothermal Hydrothermal Liquefaction of Soy Protein Isolate</b> .....	69
<i>James Sheehan, Phillip E. Savage</i>	
<b>(48c) An Investigation on Short Residence Time Macro Algae Hydro Thermal Liquefaction in a Batch Reactor</b> .....	72
<i>Arash Izadpanah, Niccolo Le Brun, Klaus Hellgardt</i>	

<b>(48d) Hydrothermal Liquefaction (HTL) of High-Ash Algal Biomass: The Effect of Ash Contents in HTL Reactions</b> .....	73
<i>Wan-Ting Chen, Wanyi Qian, Karalyn Scheppe, Zachary Mazur, Lance Schideman, Chih-Ting Kuo, Peng Zhang, Yuanhui Zhang</i>	
<b>(48e) Simultaneous Solid, Phosphorus Recovery and Biocrude Production through Hydrothermal Liquefaction of Algae</b> .....	74
<i>Robert Hable, Sirwan Alimoradi, Shawn Benson, Colin White, Belinda S.M. Sturm, Susan M. Stagg-Williams</i>	
<b>(48f) Supercritical Water Treatment of Fractions of Crude Oil: Quantification of the Products</b> .....	75
<i>Soumya Gudiyella, Lawrence Lai, Isaiah Borne, Jianghuai Cai, Michael T. Timko, Geoffrey Tompsett, Alison Lui, William H. Green</i>	
<b>(48g) Supercritical Water Process - Finding a Way to Accomodate into Petroleum Industry</b> .....	76
<i>Ki-Hyouk Choi, Joo-Hyeong Lee, Ashok K. Punetha, Emad Shafei, Abdullah Abdulhadi, Muneef Qarzouh, Bader Al-Otaibi</i>	
<b>(56a) Effect of Date Pit Based Additive on the Thermal Stability of Water-Based Drilling Fluid: Experimental Studies and Mathematical Modeling</b> .....	77
<i>Jimoh K. Adewole, Abdullah S. Sultan</i>	
<b>(56b) Biocarbon Applications- Current Status and Future Directions</b> .....	78
<i>Amar K. Mohanty</i>	
<b>(56c) Development of a Pilot-Scale Phytate Extraction System from Ethanol Coproducts</b> .....	79
<i>Cristiano Reis, Bo Hu, Carlos Zamalloa, Aravindan Rajendran, Yanmei Zhang, Xin Zhang, Hongjian Lin, Tanner Barnharst, Yuchuan Wang, Yu Cao</i>	
<b>(56d) New Biocomposite Materials from Poly(lactic acid) Blended with Poly(ethylene glycol) and Biobased Carbon</b> .....	82
<i>Michael Snowdon, Manju Misra, Amar K. Mohanty</i>	
<b>(56e) Effect of Butyl Glycidyl Ether Model Co-Monomer on Poly (glycerol succinate) Network and Dynamics for the Design of Multifunctional Hyperbranched Polymers</b> .....	83
<i>Jean-Mathieu Pin, Oscar Valerio, Manju Misra, Amar K. Mohanty</i>	
<b>(56f) Value Added Biodegradable Materials from Industrial Wastes</b> .....	84
<i>Manju Misra, Amar K. Mohanty, Nima Zarrinbakhsh, Tao Wang, Arturo Rodriguez-Urbe, Rajendran Muthuraj, Singaravelu Vivekanandhan</i>	
<b>(66a) Indirect Liquefaction of Biomass to Transportation Fuels Via Mixed Oxygenated Intermediates</b> .....	85
<i>Eric C. D. Tan, Lesley J. Snowden-Swan, Michael Talmadge</i>	
<b>(66b) Incorporating Unsteady-State Fermentation Models in Aspen Plus: Fed-Batch and in Situ Gas Stripping Simulation and Analyses</b> .....	86
<i>Kwabena Darkwah, Jeffrey Seay, Barbara L. Knutson</i>	
<b>(66c) Techno-Economic Analysis of Direct Coal-Biomass to Liquids (CBTL) Plants with Shale Gas Utilization and CO2 Capture and Storage (CCS)</b> .....	87
<i>Yuan Jiang, Debangsu Bhattacharyya</i>	
<b>(66d) Techno-Economic (TEA) and Life Cycle Analysis (LCA) of the Pyrolysis-Bioenergy-Biochar Pathway for Carbon-Negative Energy</b> .....	88
<i>Wenqin Li</i>	
<b>(66e) Techno-Economic and Environmental Life Cycle Assessments of Hydrocarbon Biofuel from Loblolly Pine</b> .....	89
<i>Olumide Winjobi, Wen Zhou, Ezra Bar-Ziv, Paul Langford, David R. Shonnard</i>	
<b>(66f) Novel Process of Biofuel Production from Acid Oil and Hydrous Bioethanol Using Ion-Exchange Resin; I. Experimental Optimization of Operating Conditions</b> .....	90
<i>Naomi Shibasaki-Kitakawa, Masato Suzue, Yasuhiro Fukushima</i>	
<b>(70a) Economic and Environmental Assessment of Methane to Ethylene Via Oxidative Coupling</b> .....	92
<i>Kenneth O'Neill, Benjamin John Davis</i>	
<b>(70b) Highly Efficient Formate Production By Hydrogenation of Captured CO2</b> .....	99
<i>Hongfei Lin, Mi Lu</i>	
<b>(70c) Allothermal Gasification of Lignite and Biomass with Integrated Syngas Cleaning and CO2 Removal</b> .....	100
<i>Peter Treiber, Michael Neubert, Jürgen Karl</i>	
<b>(70e) Biocatalytic Polymer Material for Partial Oxidation of Methane to Methanol</b> .....	109
<i>Jennifer M. Knipe, Sarah E. Baker, Joshua K. Stolaroff, James S. Oakdale, Joshua R. DeOtte</i>	
<b>(70f) XTL Process with Low Overall GHG Emissions</b> .....	110
<i>Kanchan Mondal</i>	
<b>(70g) Simulation of Hydrogen and Acetylene Production By Methane Pyrolysis in Thermal Plasma</b> .....	111
<i>Christophe Rehmet</i>	

<b>(70h) Enabling C1 Chemistry through Atmospheric Pressure Corona Discharge (Non-Thermal) Plasmas</b> .....	112
<i>Alex Yokochi, Goran Jovanovic, Annette von Jouanne, Nick AuYeung, Justin Pommerenck, Yousef Alanazi, Yu Miao, Scott Harpool, Ian Reddick, Adam Shareghi</i>	
<b>(71a) Physical Solvent Mixtures for CO2 Absorption at Simulated Pre-Combustion Conditions</b> .....	113
<i>Fan Shi, Jeffrey Culp, Nicholas Siefert, David Hopkinson</i>	
<b>(71b) High Performance, Bio-Derived Solvents for Pre-Combustion Capture</b> .....	114
<i>Jason E. Bara, Brian Flowers, Max Miñenthal</i>	
<b>(71c) New Water-Lean Amine-Based Solvents for Carbon Dioxide Capture with Low Regeneration Energy</b> .....	115
<i>Phillip K. Koech, Deepika Malhotra, David J. Heldebrant, David C. Cantu, Vassiliki-Alexandra Glezakou, Abhi Karkamkar, Feng Zheng, Mark Bearden, Roger Rousseau</i>	
<b>(71d) Molecular Design Strategies to Reduce the Viscosity of Non-Aqueous Carbon Capture Solvents</b> .....	116
<i>David C. Cantu, Deepika Malhotra, Phillip K. Koech, David J. Heldebrant, Roger Rousseau, Vassiliki-Alexandra Glezakou</i>	
<b>(71e) Molecular Simulation of CO2 Absorption in the Ionic Liquid [P2228][2-Cnpyr] Using Reaction Ensemble Monte Carlo</b> .....	117
<i>Ryan Gotchy Mullen, Steven Corcelli, Edward Maginn</i>	
<b>(71f) A Novel CO2 Absorption Process Enabled By Dedicated Biphasic Solvents: Solvent Screening and Process Development</b> .....	118
<i>Hong Lu, Shihan Zhang, Qing Ye, David Ruhter, Kevin O'Brien, Wei Zheng, B.K. Sharma, Viktoriya Gomilko, Yongqi Lu</i>	
<b>(71g) Deterministic and Stochastic Mass Transfer Models for CO2 Capture Processes</b> .....	119
<i>Anderson Soares Chinen, Joshua Morgan, Benjamin Omell, Debangsu Bhattacharyya, David C. Miller</i>	
<b>(72a) Mechanism of Furfural Hydrodeoxygenation on Metal/Metal Oxide Catalysts</b> .....	120
<i>Alexander V. Mironenko, Glen R. Jenness, Dionisios G. Vlachos</i>	
<b>(72b) Kinetic Analysis of Hydrogenation and Hydrogenolysis of Complex Furans Over Supported Noble Metals</b> .....	121
<i>Ying Lin Louie, Alexis T. Bell</i>	
<b>(72c) ZrO2 Is Preferred over TiO2 As Support for the Ru-Catalyzed Hydrogenation of Levulinic Acid to I-Valerolactone</b> .....	122
<i>Homer Genuino, Jamal Ftouni, Li Lu, Christopher Kieley, Pieter Bruijninx, Bert Weckhuysen</i>	
<b>(72d) C–O Bond Hydrogenolysis of Biomass–Derived Cyclic Ethers over Ni–Based Catalysts</b> .....	123
<i>Elmira Soghrati Khorasgani, Catherine Choong, Sibudjing Kawi, Armando Borgna</i>	
<b>(72e) A Novel Pathway to 1,5-Pentanediol without the Use of Noble Metals</b> .....	124
<i>Zachary Brentzel, Kevin J. Barnett, Kefeng Huang, Christos T. Maravelias, George W. Huber, James A. Dumesic</i>	
<b>(72f) Evaluation and Characterization of Carbon-Supported Nobel Metals for the Hydrodeoxygenation (HDO) of Acetic Acid</b> .....	125
<i>Jose Contreras-Mora, J.R. Monnier, Christopher Williams</i>	
<b>(72g) Direct Conversion of Methane to Methanol and Ethanol</b> .....	126
<i>Chukwuemeka Okolie, Yasmeen Belhseine, Libor Kovarik, Eli Stavitski, Carsten Sievers</i>	
<b>(72h) Aqueous-Phase Phenol Hydrogenation over Platinum and Rhodium: Electrocatalysis Versus Thermal Catalysis</b> .....	127
<i>Nirala Singh, Yang Song, Oliver Gutiérrez, John L. Fulton, Donald M. Camaioni, Charles T. Campbell, Johannes A. Lercher</i>	
<b>(72i) Highly Efficient Conversion of Terpenoids to High Density Bio- Jet Fuels</b> .....	128
<i>Xiaokun Yang, Hongfei Lin</i>	
<b>(91b) Organosolv and Kraft Lignin: Fractionation and Conversion to Melt Spun and Electrospun Carbon Fibers</b> .....	129
<i>Omid Hosseinaei, David P. Harper, Joseph J. Bozell, Timothy Riels</i>	
<b>(91c) Chemically Modified Lignin Surfactant: Synthesis, Characterization and Their O/W Interfacial Properties</b> .....	130
<i>Zhe Zhang, Yi Zhang, Arie Mulyadi, Yulin Deng</i>	
<b>(91d) Reactive Diluents Prepared from Lignin Model Compounds:the Effect of Structure and Impurities on the Properties of Vinyl Ester Resins</b> .....	131
<i>Alexander W. Bassett, Daniel P. Rogers, Joshua M. Sadler, John J. La Scala, Richard P. Wool, Joseph F. Stanzione</i>	
<b>(91e) Fine Fractionation of Lignin By Molecular Weight Using Supercritical Fluids</b> .....	132
<i>Adam S. Klett, Mark C. Thies</i>	
<b>(98a) Application of Metamaterials and Rectenna for Capture of Blackbody Radiation</b> .....	133
<i>Evan Allison, Zach Thacker, Shendu Yang, Patrick J. Pinhero</i>	

<b>(98b) Testing Materials and Devices for Electromagnetic Energy Capture and Conversion to Electricity .....</b>	<b>134</b>
<i>Patrick J. Pinhero, Zach Thacker, Evan Allison, Shendu Yang</i>	
<b>(98c) Incorporation of Photo-Responsive Membrane Protein Species into Nanostructured Silica for Light-Driven Ion Transport.....</b>	<b>135</b>
<i>Matthew N. Idso, Niels Zussblatt, Daniela Lalli, Naomi Baxter, Guido Pintacuda, Songi Han, Bradley F. Chmelka</i>	
<b>(98d) Suppression of Infrared Absorption in Nanostructured Metals By Controlling Faraday Inductance and Electron Path Length .....</b>	<b>136</b>
<i>Sang Eon Han</i>	
<b>(98e) Light Harvesting in Dye Sensitized Solar Cell Based on Consensitizer in Core-Shell Nanofiber Configuration Reducing Charge Recombination.....</b>	<b>137</b>
<i>Wallace Woon-Fong Leung</i>	
<b>(99a) Nanocrystal Doping Stabilizes the Perovskite Phase of Cesium Lead Iodide.....</b>	<b>138</b>
<i>Subham Dastidar, David A. Egger, Liang Z. Tan, Samuel B. Cromer, Andrew D. Dillon, Shi Liu, Leor Kronik, Andrew M. Rappe, Aaron Fafarman</i>	
<b>(99b) Metal Oxide Electron-Selective Layers for Inverted Perovskite Solar Cells By Atomic Layer Deposition.....</b>	<b>139</b>
<i>Axel Palmstrom, Kevin Bush, Michael McGehee, Stacey F. Bent</i>	
<b>(99c) Transparent Conductive Oxide Nanocrystals Coated with Insulators By Atomic Layer Deposition.....</b>	<b>140</b>
<i>John Ephraim, Deanna Lanigan, Corey Staller, Delia J. Milliron, Elijah Thimsen</i>	
<b>(99d) Microstructure Development in Cu<sub>2</sub>ZnSn(SxSe<sub>1-x</sub>)<sub>4</sub> Thin Films during Annealing of Colloidal Nanocrystal Coatings.....</b>	<b>141</b>
<i>Boris D. Chernomordik, Priyanka M. Ketkar, Anne K. Hunter, Amélie E. Béland, Lorraine F Francis, Eray S. Aydil</i>	
<b>(99e) Multiscale Study of the Self-Organized Vertical Concentration Profile of PEDOT:PSS for Work Function Optimization .....</b>	<b>142</b>
<i>Min Huang</i>	
<b>(99f) Study of Charge Transfer Dynamics in Spray Deposited Cu<sub>2</sub>ZnSnS<sub>4</sub> (CZTS) Photoelectrodes for Performance Improvement.....</b>	<b>149</b>
<i>Animesh Mondal, James G. Radich</i>	
<b>(99g) Highly Efficient Solar Cells Made with Cu<sub>1-x</sub>K<sub>x</sub>InSe<sub>2</sub> Alloys: A Foundation for Engineering K in Cu(In,Ga)Se<sub>2</sub> .....</b>	<b>150</b>
<i>Christopher P. Muzzillo, Jian V. Li, Timothy J. Anderson</i>	
<b>(99h) Study of Electron Transport Mechanism in Dye-Sensitized Solar Cell with the Effect of Morphology, Crystalline Structure and Electron Mobility.....</b>	<b>151</b>
<i>Yerkin Shabdan, Blake Hanford, Amirkhan Temirbayev, Kadyrjan Dikhanbayev, Nurxat Nuraje</i>	
<b>(100a) Solventless Synthesis of Zeolitic-Imidazole Framework ZIF-8 Membranes Via Crystal-Specific Sintering Phenomenon .....</b>	<b>152</b>
<i>Hyuk Taek Kwon, Hae-Kwon Jeong</i>	
<b>(100b) Microplasmas for Substrate-Independent Deposition of Nanostructured Metals and Oxides .....</b>	<b>153</b>
<i>Michael Gordon, Andrew Pebley, Katie Mackie</i>	
<b>(100c) Hierarchically-Structured Porous Carbon Films By Multiscale Templating and Interfacial Engineering.....</b>	<b>154</b>
<i>Megha Sharma, Zheng Tian, Mark A. Snyder</i>	
<b>(257k) Effect of the Chain Length of Alkylamine on Film Formation from Alcohol-Soluble Copper Complex Ink.....</b>	<b>155</b>
<i>Wen Xu</i>	
<b>(100e) Understanding of Diffusion Pathway of Cyclohexane through Nanoscale MFI Zeolite .....</b>	<b>156</b>
<i>Xiaoduo Qi, Vivek Vattipalli, Wei Fan</i>	
<b>(100f) Neutron Reflectometry Investigation of Hydrogen in Plasma Treated Hydrogen Doped Nanoporous TiO<sub>2</sub> Thin Films for Water Splitting Photocatalysis.....</b>	<b>157</b>
<i>Syed Z. Islam, Allen Reed, Suraj Nagpure, Namal Wanninayake, James Browning, Doo Young Kim, Stephen E. Rankin</i>	
<b>(100g) Synthesis of Tin(II) Monosulfide Nanoplates: A Potential 2D Material.....</b>	<b>158</b>
<i>Nancy Trejo, Anne Hunter, Cody Wrasman, Shreyashi Ganguly, John Dwyer, Eray S. Aydil</i>	
<b>(100h) MoS<sub>2</sub>-Passivated Bilayer Phosphorene Phototransistors .....</b>	<b>159</b>
<i>Youngwoo Son, Albert Tianxiang Liu, Volodymyr Koman, Qing Hua Wang, Michael S. Strano</i>	
<b>(106b) Process Simulation and Economic Analysis of Producing Liquid Transportation Fuels from Biomass.....</b>	<b>160</b>
<i>Pengcheng Li, Zhihong Yuan, Mario Richard Eden</i>	

<b>(106c) Modeling Plasma Gasification of Biomass with Thermodynamic and Kinetic Approach in Series.....</b>	161
<i>Babita Verma, Rajesh Elangovan, T. Renganathan, S. Pushpavanam</i>	
<b>(106d) Sustainable Solar Fuel Production By a Mixed Metal Oxide Based Thermochemical H<sub>2</sub>O/CO<sub>2</sub> Splitting Cycle.....</b>	162
<i>Rahul Bhosale, Parag N. Sutar, Fares Almomani, Ivo Alxneit</i>	
<b>(106e) Ti-Base Alloy Coking Behavior during Steam Cracking of Ethane.....</b>	171
<i>Stamatis A. Sarris, Kevin M. Van Geem, Marie-Françoise Reyniers, Guy B. Marin</i>	
<b>(106f) Fermentation Design and Gas Transfer Considerations for Biochemical Methane Conversion.....</b>	180
<i>Kyle Stone, Matthew Hilliard, Q. Peter He, Jin Wang</i>	
<b>(79a) How Do Electrolyte Cations Affect Activity and Selectivity of the Electrochemical Reduction of CO<sub>2</sub> over Ag and Cu?.....</b>	181
<i>Meenesh Singh, Youngkook Kwon, Yanwei Lum, Joel W. Ager, Alexis T. Bell</i>	
<b>(343f) Understanding the Influence of [EMIM] Cl on the Suppression of the Hydrogen Evolution Reaction on Transition Metal Electrodes.....</b>	182
<i>Jeremy T. Feaster, Anna L. Jongorius, Stephanie Nitopi, Christopher Hahn, Makoto Urushihara, Karen Chan, Jens K. Nørskov, Thomas F. Jaramillo</i>	
<b>(79c) Effects of Temperature and Gas-Liquid Mass Transfer on the Operation of Small Electrochemical Cells for the Quantitative Evaluation of CO<sub>2</sub> Reduction Electrocatalysts.....</b>	183
<i>Peter Lobaccaro, Meenesh Singh, Ezra L. Clark, Youngkook Kwon, Alexis T. Bell, Joel W. Ager</i>	
<b>(343h) Surface Structure Engineering of Cu Thin Films for Electrochemical CO<sub>2</sub> Reduction.....</b>	184
<i>Christopher Hahn, Toru Hatsukade, Arturas Vailionis, Drew Higgins, Stephanie Nitopi, Jeremy T. Feaster, Anna L. Jongorius, Thomas F. Jaramillo</i>	
<b>(79e) Electrochemical Reduction of CO<sub>2</sub> over Phase-Segregated Cu<sub>2</sub>g Bimetallic Electrodes with Enhanced Oxysenate Selectivity By CO Spillover.....</b>	185
<i>Ezra Clark, Alexis T. Bell</i>	
<b>(79f) Interaction of Anion-Exchange Ionomers with Carbon Dioxide Reduction Electrocatalysts.....</b>	186
<i>Karthish Manthiram, Aidan Q. Fenwick, Julian P. Edwards, Robert H. Grubbs</i>	
<b>(79g) Electrochemical Reduction of Carbon Dioxide Using Solid Oxide Electrolysis Cells.....</b>	187
<i>Juliana S. A. Carneiro, Xiang-Kui Gu, Abdul Rihan, Zachary Kuczera, Eranda Nikolla</i>	
<b>(110a) Overview of U.S. DOE Environmental and Waste Cleanup Programs.....</b>	188
<i>Ken Picha</i>	
<b>(137a) Adapting Power Generation Lessons Learned to Industrial CO<sub>2</sub> Capture.....</b>	189
<i>Gerald Hill, Kimberly Sams-Gray</i>	
<b>(137b) Highly Efficient Warm Gas Carbon Capture System for IGCC Power Plants.....</b>	190
<i>Ambalavanan Jayaraman, Gokhan Alptekin, Steve Dietz, Matt Cates, Michael Bonnema, Chakravarthy Sishla, Ashok Rao</i>	
<b>(137c) Development and Optimization of Pressure/Temperature Swing Adsorption for Post-Combustion Carbon Capture.....</b>	191
<i>Karson Leperi, Fengqi You, Randall Q. Snurr</i>	
<b>(137d) An Investigation of SO<sub>2</sub> Interference on Separation Performance of Amine-Containing Facilitated Transport Membrane for CO<sub>2</sub> Capture from Flue Gas.....</b>	192
<i>Dongzhu Wu, Chunhu Sun, Prabir K. Dutta, W.S. Winston Ho</i>	
<b>(137e) Engineering Enhanced Permeability and Selectivity in Hybrid CO<sub>2</sub> Capture Membranes.....</b>	193
<i>Jeffrey Urban</i>	
<b>(137f) Two Dimensional Nanosheets-Embedded Thin Film Composite Membrane for CO<sub>2</sub> Capture Applications.....</b>	194
<i>Ho Bum Park</i>	
<b>(137g) CO<sub>2</sub> Capture from Power Plant Flue Gas By Polaris™ Membranes: Update on Field Demonstration Tests.....</b>	195
<i>Jay Kniep, Richard Baker, Carlos Casillas, Ken Chan, Don Fulton, Brice Freeman, Pingjiao Hao, Jurgen Kaschemekat, Jennifer Ly, Tim Merkel, Vincent Nguyen, Zhen Sun, Xuezheng Wang, Xiaotong Wei, Lloyd S. White</i>	
<b>(138b) Selective Hydrogenation of Bio-Oil Model Compounds over Molybdenum Carbide Supported Catalysts.....</b>	196
<i>Sarah W. Paleg, Joshua Schaidle, Levi T. Thompson</i>	
<b>(138c) Guaiacol Deoxygenation Using Methane over Pt-Bi Catalysts: Reaction Pathways and Kinetics.....</b>	199
<i>Yang Xiao, Arvind Varma</i>	
<b>Fluidized Bed Catalytic Glycerol Hydrodeoxygenation to 1,3-Propanediol.....</b>	200
<i>Mahesh Edake, Jean-Luc Dubois, Mohammad Jaber Darabi Mahboub, Gregory Patience</i>	
<b>(138e) Reaction Pathways for the Hydrodeoxygenation of Anisole and Guaiacol over Zn-Pt Bimetallic Catalysts.....</b>	201
<i>Daming Shi, John Vohs</i>	



<b>(138f) Novel Bio-Oil Hydrodeoxygenation Catalysts Based on Strong Electrostatic Adsorption</b> .....	202
<i>Yaseen Elkasabi, Qiuli Liu, Yongsuck Choi, Akwasi A. Boateng, John R. Regalbuto</i>	
<b>(138g) Biomass Pyrolysis Interfaced with Honeycomb Structured Upgrading Reactor for the Production of High Quality Biofuels</b> .....	203
<i>Conrad Zhang, Liaoyuan Mao, Yanxin Li</i>	
<b>(138h) Upgrading of Biomass Pyrolysis Vapors of Modified ZSM-5: Effects of Metal(s) Loading and Pretreatment</b> .....	204
<i>Matthew M. Yung, Anne Starace, Calvin Mukarakate, Kristiina Iisa, Kim Magrini, Mark Nimlos</i>	
<b>(138i) Cross Metathesis of Unsaturated Carboxylic Acids to Bioterephthalic Acid Intermediates</b> .....	205
<i>Erisa Saraçi, Lan Wang, Klaus Theopold, Raul F. Lobo</i>	
<b>(139a) Ultralight, Reusable Cellulose Diacetate Aerogels for Selective Fluid Sorption</b> .....	206
<i>Anurodh Tripathi, Saad A. Khan, Orlando J. Rojas</i>	
<b>(139b) Exploring Cellulose Nanofibrils As Renewable Resource for Metal-Free Heteroatoms-Doped Carbon Electrocatalyst</b> .....	207
<i>Arie Mulyadi, Zhe Zhang, Michael Dutzer, Wei Liu, Yulin Deng</i>	
<b>(139d) Cellulose Nanofibers from Recycled Pulp: Production, Characterization and Application to Reinforce Recycled Paper</b> .....	208
<i>Ana Balea, Noemi Merayo, Elena Fuente, Angeles Blanco, Carlos M Negro</i>	
<b>(139e) Phenolic Catalyzed Hydroxyl Radical Oxidation for Cellulose Nanofiber Production</b> .....	210
<i>Iman Beheshti Tabar, Nathan S. Mosier</i>	
<b>(140a) Performance of Hematite Oxygen Carrier for Hydrocarbon Conversion</b> .....	211
<i>Mark W. Smith, Dushyant Shekhawat, Douglas Straub, Nicholas C. Means</i>	
<b>(140b) Characterization of Ilmenite As Oxygen Carrier during Chemical Looping Combustion and Reforming</b> .....	212
<i>Dennis Lu, Zhenkun Sun, Firas Ridha, Robin Hughes</i>	
<b>(140c) The Role of Support in Increasing Agglomeration Resistance of Cu-Based Oxygen Carriers</b> .....	213
<i>Qasim Imtiaz, Andac Armutlulu, Muhammad Awais Naeem, Christoph Mueller</i>	
<b>(140d) Effects of Structural and Surface Promoters on Manganese-Containing Oxides in Cyclic Redox Reactions</b> .....	214
<i>Fanxing Li</i>	
<b>(140e) Morphological Evolution of Transition Metal Nanostructures with Oxygen Dissociation and Migration During Chemical Looping Processes</b> .....	215
<i>Lang Qin, Zhuo Cheng, Mengqing Guo, Jonathan A. Fan, Liang-Shih Fan</i>	
<b>(140f) Pt Modified Fe<sub>2</sub>O<sub>3</sub>@CeO<sub>2</sub> Core/Shell Structures for Effective Thermochemical Water Splitting</b> .....	216
<i>Davood Hosseini, Paula Abdala, Sung Min Kim, Christoph Mueller</i>	
<b>(140g) Study on the Performance of Fe<sub>2</sub>O<sub>3</sub>/MgO/Al<sub>2</sub>O<sub>3</sub> in Chemical- Looping Hydrogen Generation</b> .....	217
<i>Hao Liang</i>	
<b>(145a) Investigating Synergetic Effects Between Deposited PGM Nanoparticles and Transition Metal Carbide Nanotube Support through Surface Characterization and Device Performance</b> .....	218
<i>Shibely Saha, Dongmei (Katie) Li, Shuai Tan, Brian Leonard</i>	
<b>(145b) Bimetallic Ru-Pt and Pt-Co Fuel Cell Catalysts Prepared By Strong Electrostatic Adsorption and Electroless Deposition</b> .....	219
<i>John Meynard M. Tengco, Bahareh Alsadat Tavakoli Mehrabadi, Akkarat Wongkaew, Yunya Zhang, Weijian Diao, Taylor R. Garrick, John W. Weidner, John R. Monnier, John R. Regalbuto</i>	
<b>(145c) Understanding the Effects of pH and Alkali Cations on H/OH Adsorption and Hydrogen Oxidation on Transition Metal Surfaces</b> .....	220
<i>Ian T. McCrum, Michael Janik</i>	
<b>(145d) Nanoparticle Catalysts Supported on Substitutionally Doped Graphene: Effects on Activity and Stability for Hydrogen Oxidation</b> .....	221
<i>Stephen A. Giles, Stavros Caratzoulas, Dionisios G. Vlachos, Yushan Yan</i>	
<b>(145e) Impact of Combining Metal Nanoparticle Catalysts and Semiconductor Photo-Electrodes on Photo-Catalytic Performance</b> .....	222
<i>Paul Hernley, Steven Chavez, Joseph Quinn, Suljo Linic</i>	
<b>(145f) Trends in Hydrogen Evolution Reaction Activity Among Metal Modified Carbide Thin Films and Powders</b> .....	223
<i>Brian M. Tackett, Qian Zhang, Yannick C. Kimmel, Jingguang G. Chen</i>	
<b>(145g) Experimental Determination of Water Orientation Effects on Kinetic Barriers to Alkaline Hydrogen Oxidation and Evolution</b> .....	224
<i>Maureen H. Tang, Joshua Snyder, Kiran Vasudevan, Jennifer Gallup</i>	

<b>(148a) Co-Oxidation of CO and Hydrocarbons on Pd/Ceria-Zirconia/Al<sub>2</sub>O<sub>3</sub> Three-Way Catalysts: Experiments and Modeling</b> .....	225
<i>Wendy Lang, Michael P Harold, Yisun Cheng, Carolyn Hubbard, Manish Sharma, Paul Laing</i>	
<b>(148b) Interaction Between Highly Dispersed Ionic Pd<sup>2+</sup> and Mn-Ce Solid Solution Support for Low Temperature CO Oxidation</b> .....	228
<i>Chao Wang, Cun Wen, Erdem Sasmaz, Jochen Lauterbach</i>	
<b>(148c) Effect of Rare-Earth Metal Dopants on Ceria Catalysts for CO Oxidation</b> .....	229
<i>Kyung-Jong Noh, Jeong Woo Han</i>	
<b>(148d) Carbon Monoxide Oxidation and Preferential Oxidation on Pt Alloy Nanoparticle Catalyst with Engineered Surface</b> .....	230
<i>Sang Youp Hwang, Eric Yurchekfrod, Changlin Zhang, Zhenmeng Peng</i>	
<b>(148j) Sensitivity of XANES and XES to the local environment: Multiple Adsorption of H<sub>2</sub>O and NH<sub>3</sub> on Cu-SSZ-13</b> .....	231
<i>Renqin Zhang, Hui Li, Christopher Paolucci, Atish A. Parekh, Janos Szanyi, Feng Gao, Trunojoyo Anggara, Hui Li, William F. Schneider, Fabio Ribeiro, Jean-Sabin McEwen</i>	
<b>(148f) Mercury Oxidation Over Cu-SSZ-13 Catalysts Under SCR Conditions for Power Plant Applications</b> .....	234
<i>Benjamin Galloway, Bihter Padak</i>	
<b>(148g) Thiophenic Species Removal Over a New Zn-Offretite Zeolite Via Selective Adsorption for FCC Processes</b> .....	235
<i>Yira Aponte, Hugo de Lasa</i>	
<b>(148h) Wash-Coat Development for Lean-Burn Engine-Exhaust Aftertreatment: A Novel Way of Incorporation of Binder to Pd Supported on Sulfated Zirconia</b> .....	236
<i>Sreshtha Sinha-Majumdar, Gokhan Celik, Anne-Marie C. Alexander, Umit S. Ozkan</i>	
<b>(148i) Carboxylation of Propylene Oxide to Propylene Carbonate in Slurry and Trickle Bed Reactors</b> .....	237
<i>Pallavi Bobba, Xin Jin, Raghunath V. Chaudhari, Bala Subramaniam</i>	
<b>(167a) Nanorod-like CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> for Planar Heterojunction Perovskite Solar Cell with Improved Performance</b> .....	238
<i>Yan-Zhen Zheng, Erfei Zhao, Xia Tao</i>	
<b>(167b) Lead-Free, Hybrid, Organic-Inorganic Halide for Light Harvesting</b> .....	239
<i>Kanchan Mondal, Chung-Ying Tsai</i>	
<b>(167c) Improving Electron Transport in Nanostructured TiO<sub>2</sub> Electrode</b> .....	240
<i>Bin Liu</i>	
<b>(167d) Symmetry-Breaking in Light-Trapping Nanostructures on Silicon for Solar Photovoltaics</b> .....	241
<i>Sang Eon Han, Seok Jun Han, Swapnadip Ghosh, Tianhao Cai, Brittany R. Hoard, Sang M Han</i>	
<b>(167e) Computational and Kinetic Considerations for Morphology Prediction of Donor-Acceptor Oligomers for Organic Photovoltaics</b> .....	242
<i>Michael Henry, Eric Jankowski</i>	
<b>(167f) Enhancing Dye Sensitized Solar Cell J-V Behavior By Integrating Nanoscale Polymer Films</b> .....	243
<i>Yuriy Y. Smolin, Austin G. Kuba, Masoud Soroush, Kenneth K.S. Lau</i>	
<b>(167g) Photocatalytic Photosystem I/PEDOT Composite Films Prepared By Vapor Phase Polymerization</b> .....	244
<i>Maxwell Robinson, David Cliffl, G. Kane Jennings</i>	
<b>(176a) Energy Innovation - Challenges to Commercialization of New Energy Technology</b> .....	245
<i>Nick Tillmann</i>	
<b>(176b) Energy and Nanomaterials: Interfacial Intersection</b> .....	246
<i>Randy L. Vander Wal</i>	
<b>(176c) Carbon Nanotubes in Real World Applications – A Perspective on Translational Challenges and Industry Progress</b> .....	247
<i>Amy Heintz</i>	
<b>(176d) Solution Processed Inorganic Solar Cells</b> .....	248
<i>Rakesh Agrawal</i>	
<b>(176e) Processing as Viable Strategy for Forming High Performance Lithium Ion Battery Electrodes</b> .....	249
<i>Yuzi Zhang, Brett Lucht, Arijit Bose</i>	
<b>(176f) Nanostructured Block Copolymers for Lithium Batteries and Biofuels Purification</b> .....	250
<i>Nitash Balsara</i>	
<b>(180b) High Performance LT-SOFC Based on a Strontium Iron Cobalt Molybdenum Oxide Based Ceramic Anode Support</b> .....	251
<i>Ke-Ji Pan, Colin Gore, Lei Wang, Luis Correa, Thomas Langdo, Bryan Blackburn</i>	
<b>(180c) Improved Activity and Stability of Ni-Based Anode for Direct Methanol-Fueled Solid Oxide Fuel Cells</b> .....	252
<i>Ping Li, Yongdan Li</i>	

<b>(180d) Low Temperature Sintering of Cathode-Supported Micro-Tubular Solid Oxide Fuel Cells Using Sintering Aids</b> .....	253
<i>Dhruba Panthi, Bokkyu Choi, Atsushi Tsutsumi</i>	
<b>(180f) Impact of Molecular- and Mesoscales on Macroscopic Thermodynamic and Transport Properties in Perfluorosulfonic-Acid Membrane Using Multiscale Modeling</b> .....	254
<i>Andrew Crothers, Clayton J. Radke, Shouwen Shi, Adam Weber</i>	
<b>(180g) Analysis and Multi-Objective Optimization of Solid Oxide Fuel Cell–Gas Turbine Hybrid Cycle</b> .....	255
<i>Shivom Sharma, François Maréchal</i>	
<b>(180h) Onsite: Operation of a Novel SOFC-Battery Integrated Hybrid Generator for Telecommunication Energy Systems</b> .....	256
<i>Erich Erdle</i>	
<b>(183a) Catalytic Bitumen Partial Upgrading Under Methane Environment</b> .....	266
<i>Hua Song, Peng He</i>	
<b>(183b) Molecular Characterization and Modeling for Feedstocks Including Heavy Oil and Reactors</b> .....	267
<i>Shu Wang, Suphat Watanasiri, Darin Campbell</i>	
<b>(183c) An Innovative Technique for Oxy-Cracking of Quinolin-65 As a Model Heavy Hydrocarbon Compound</b> .....	268
<i>Abdallah Manasrah, Nashaat N. Nassar, Amjad El-Qanni, Ismail Badran</i>	
<b>(183d) Upgrading of Petroleum Vacuum Residue Using Supercritical Hydrocarbon Solvents in Batch and Continuous Systems</b> .....	269
<i>Doo-Wook Kim, Chang-Ha Lee</i>	
<b>(183e) The Binary Pyrolysis of Sulfur Compounds with Alkyl Aromatics and n-Alkanes</b> .....	270
<i>Sebnem Hande Ozoren Yasar, Muzaffer Yasar</i>	
<b>(183f) Use of Unconventional Resources in State of the Art Oil Refining Processes</b> .....	271
<i>Refika Cetintas, Ziya Kostereli, Serhat Arca, Elif Kocaman, Emel Baskent, Ramazan O. Caniaz</i>	
<b>(183g) Developing a Dead Heavy Oil Viscosity Correlation for Lower Fars, Kuwait</b> .....	272
<i>Adel Elsharkawy, Saad Alrashdan</i>	
<b>(193a) Renewable Chemicals and Biofuels from Waste to Close the Loop of the Circular Economy</b> .....	273
<i>Timothy Cesarek</i>	
<b>(193b) Compact Steam Reformers for Power and Hydrogen Generation</b> .....	282
<i>Saurabh A. Vilekar, Christian Junaedi, Richard Mastanduno, Subir Roychoudhury</i>	
<b>(193c) Development of Smart Ni Based Nano-Oxyhydrides for Hydrogen Production from Bioethanol</b> .....	283
<i>Louise Jalowiecki-Duhamel</i>	
<b>(193d) Exploring Transition Metal Carbides and Phosphides for Ex-Situ Catalytic Fast Pyrolysis</b> .....	284
<i>Yagya Regmi, Nicole Labbé, Stephen Chmely</i>	
<b>(193e) Microwave-Assisted Fast Pyrolysis (MW-FP) of Several Lignocellulosic Feedstocks</b> .....	285
<i>Tyler L. Westover, Rachel Emerson, John Ryan, C. Luke Williams</i>	
<b>(193f) Biomass to Energy – A Novel Process</b> .....	286
<i>Rakesh Gupta</i>	
<b>(193g) Generation of Hydrogen from Solid Feedstock Using the Heatpipe Reformer Technology with in-Situ Hydrogen Separation By Nickel Membranes</b> .....	295
<i>Jonas M. Leimert, Jürgen Karl</i>	
<b>(193h) Performance of Transition Metal Catalysts Based on Initial Predictor for Fischer Tropsch Reaction</b> .....	305
<i>Sumegha Godara, Suraj Gyawali, Daniela S. Mainardi</i>	
<b>(201a) Session Keynote - Co-Extrusion: Advanced Manufacturing for Energy Devices</b> .....	306
<i>Corie Cobb</i>	
<b>(201b) Instability of Reversible Pump Turbines and Its Physical Origin</b> .....	307
<i>Yuning Zhang</i>	
<b>(201c) Simplified Model of a Redox Flow Battery for Deriving Design and Dispatch Strategies in a Resource Planning Tool</b> .....	308
<i>Bharatkumar Suthar, Michael Scioletti, Alexandra Newman, Paul Kohl</i>	
<b>(201d) Selection of Ion-Exchange Membrane for Vanadium Redox Flow Battery</b> .....	309
<i>Jiri Vrana, Jiri Charvat, Petr Mazur, Jan Dundalek, Jaromir Ponedec, Juraj Kosek</i>	
<b>(201e) Energy Storage for the Enhancement of Penetration Level of Wind Energy: A Case Study</b> .....	310
<i>Yuning Zhang</i>	
<b>(201f) An Investigation of a Polysulfide – Polyiodide Aqueous Redox Flow Battery</b> .....	311
<i>Liang Su, Andres F. Badel, Fikile Brushett</i>	
<b>(202a) Comparative Techno-Economic Analysis of Bio-Hydrocarbon Production from Pyrolysis-Derived Bio-Oil Via Hydroprocessing and Zeolite Cracking</b> .....	312
<i>Mobolaji Shemfe, Fidalgo Beatriz</i>	

<b>(202b) Economics of Biofuels and Bioproducts from an Integrated Pyrolysis Biorefinery</b> .....	313
<i>Qi Dang, Wenhao Hu, Marjorie Rover, Robert C. Brown, Mark Mba Wright</i>	
<b>(202e) A Kinetic Model for Updraft Biomass Gasification By Aspen Plus</b> .....	314
<i>Jia Yu, Joseph D. Smith</i>	
<b>(202f) A Multiscale, Multiphysics Modelling Framework for the Processes Involved in Consolidated Bioprocessing</b> .....	315
<i>Kristian Mc Caul, Nilay Shah, Cleo Kontoravdi, Xiao Yun Xu</i>	
<b>(205a) Pd Particle Stabilization on Carbon Supports Under Hydrothermal Conditions</b> .....	316
<i>Jiajie Huo, Robert L. Johnson, Pu Duan, Hien N. Pham, Abhaya K. Datye, Klaus Schmidt-Rohr, Brent H. Shanks</i>	
<b>(205j) Study the Effect of Metal Salts on Glucose Isomerization by Means of Raman and Reaction Induced Difference Infrared Spectroscopy</b> .....	317
<i>Shreyas Acharya, Ayman Saleh, George Tsilomelekis</i>	
<b>(205c) Vacancy-Mediated Hydrodeoxygenation of Furfuryl Alcohol over Metal Oxide</b> .....	318
<i>Konstantinos Goulas, Glen R. Jenness, Alexander V. Mironenko, Tobias Mazal, Dionisios G. Vlachos</i>	
<b>(205d) Influence of Water and Solvents on the Production of Levoglucosenone and 5-(Hydroxymethyl)Furfural from Cellulose</b> .....	319
<i>Jiayue He, Fei Cao, Pranav U. Karanjkar, Siddarth H. Krishna, Kefeng Huang, Christos T. Maravelias, James Dumesic, George W. Huber</i>	
<b>(205e) Transformation of Chitin into Value-Added Chemicals</b> .....	320
<i>Ning Yan</i>	
<b>(205f) Direct Carbon-Carbon Coupling of Furanics with Acetic Acid over Brønsted Zeolites</b> .....	321
<i>Abhishek Gumidyala, Bin Wang, Steven Crossley</i>	
<b>(205g) Supported Cu Electrocatalysts for Electrocatalytic Hydrogenation and Hydrogenolysis of Furfural</b> .....	322
<i>Sungyup Jung, Elizabeth J. Biddinger</i>	
<b>(205h) Rational Synthesis and Evaluation of Pd Bimetallic Catalysts for Furfural Rearrangement to Cyclopentanone in Aqueous Phase</b> .....	323
<i>Qiuli Liu, John R. Regalbuto</i>	
<b>(205i) Polymeric Solid Acid Catalysts for Efficient Hydromethylfurfural and Levulinic Acid Production from Biomass Feedstock</b> .....	324
<i>Anh Vu, Ranil Wickramasinghe, Xianghong Qian</i>	
<b>(208b) Performance of a Chemical Looping Combustion with Oxygen Uncoupling Process Development Unit</b> .....	325
<i>Kirsten Merrett, Kevin Whitty</i>	
<b>(208c) Recent Operating Experiences from Netl’s 50kWth Circulating Chemical Looping Combustion Test Facility</b> .....	326
<i>Justin Weber, Douglas Straub, Samuel Bayham</i>	
<b>(208d) The Syngas Chemical Looping Processes for Hydrogen and Electricity Co-Generation with Carbon Capture: Pilot Plant Development and Operation</b> .....	327
<i>Andrew Tong, Dawei Wang, Tien-Lin Hsieh, Dikai Xu, Cheng Chung, Christopher Poling, L.-S. Fan</i>	
<b>(208e) CFD Simulations of a Chemical Looping with Oxygen Uncoupling System: Aiding in Reactor Design</b> .....	328
<i>Matthew A. Hamilton, Kevin Whitty, JoAnn S. Lighty</i>	
<b>(208f) Mediated Oxycombustion with Integrated Uncoupled Oxygen Supply (MOBIUS)</b> .....	329
<i>Kanchan Mondal, Adam Sims</i>	
<b>(209a) Soot Nucleation and Consumption in Oxy-Coal Systems</b> .....	330
<i>Alexander J Josephson</i>	
<b>(209b) Investigation of NOx Chemistry in Oxy-Combustion Flue Gas</b> .....	331
<i>Nujhat Choudhury, Bihter Padak</i>	
<b>(209c) On the Role of Sodium Content of Fine Ash Particles in Determining Deposition Rates Under Air- and Oxy-Coal Combustion Conditions</b> .....	332
<i>Zhonghua Zhan, Andrew Fry, Jost O.L. Wendt</i>	
<b>(209d) NOx Formation in Syngas/Air Combustion at Elevated Pressure</b> .....	333
<i>Nazli Asgari, Sheikh F Ahmed, Tanvir I Farouk, Bihter Padak</i>	
<b>(209e) Formation and Decomposition Kinetics of HONO and HNO2</b> .....	334
<i>C. Franklin Goldsmith</i>	
<b>(209f) Experimental Study on NO Reduction By Iron with Methane in Wet Simualted Flue Gas</b> .....	335
<i>Yaxin Su</i>	
<b>(209g) Inferential–MODEL Based FLARE SET POINT Determination</b> .....	336
<i>Arokiaaraj Alphones, Daniel Chen, Helen Lou, Vijaya Damodara, Xianchang Li, Christopher B. Martin, Edward Fortner, Scott Evans, Matthew Johnson</i>	

<b>(211a) Multiscale Optimization and Intensification of Natural Gas Separation and Storage</b> .....	337
<i>Shachit S. Iyer, M. M. Faruque Hasan</i>	
<b>(211b) Ideas Based Synthesis of Fossil Fueled Power Generation/Hydrogen Production Flowsheets with No Carbon Dioxide Emissions</b> .....	338
<i>Patricia Pichardo, Vasilios Manousiouthakis</i>	
<b>(211c) A Heuristic-Based Model for Gasification-Based Plants with Flexible Feedstock/Product in Carbon Constrained Scenarios</b> .....	339
<i>Mohsen Dirbaz, Hamid Arastooopour, Javad Abbasian</i>	
<b>(211d) Thermodynamic Modeling and Uncertainty Quantification of CO<sub>2</sub>-Loaded Aqueous MEA Solutions</b> .....	340
<i>Joshua Morgan, Anderson Soares Chinen, Benjamin Omell, Debangsu Bhattacharyya, Charles Tong, David C. Miller</i>	
<b>(211e) Design and Advanced Optimization of a Natural Gas Combined Cycle Power Plant with CO<sub>2</sub> Capture</b> .....	341
<i>Yifan Wang, Debangsu Bhattacharyya, Richard Turton</i>	
<b>(211f) Natural Gas to Liquid Transportation Fuels Utilizing Chemical Looping Technologies for Syngas Generation: Process Synthesis and Global Optimization</b> .....	342
<i>William W. Tso, Alexander M. Niziolek, Onur Onel, Christodoulos A. Floudas</i>	
<b>(211g) Optimal Design and Operation of Hybrid CO<sub>2</sub> Capture Systems</b> .....	343
<i>Miguel Zamarripa, John Eslick, Andrew Lee, Olukayode Ajayi, Zachary Wilson, Nick Sahimidis, David C. Miller</i>	
<b>(211h) An Investigation Into the Effects of Impurities in Captured CO<sub>2</sub> stream on Safety and Environmental Indicators within Transportation Pipeline and Downstream Storage</b> .....	344
<i>Salman Masoudi Soltani, Clea Kolster, Renato P Cabral, Nilay Shah, Niall Mac Dowell</i>	
<b>(212a) Keynote - Modeling Electrochemical Interfaces: An Approach from First Principles</b> .....	345
<i>Phillippe Sautet, Stephan Steinmann</i>	
<b>(212b) Feature Engineering of Machine-Learning Chemisorption Models for Bifunctional Electrocatalyst Design</b> .....	346
<i>Zheng Li, Siwen Wang, Hongliang Xin</i>	
<b>(212c) Effect of Lanthanum Doping and Chlorine Addition on Strontium Titanate Perovskites for Electrochemically-Assisted Oxidative Dehydrogenation of Ethane</b> .....	347
<i>Doruk Dogu, Anshuman Fuller, Katja E. Binkley Meyer, Seval Gunduz, Dhruva Jyoti Deka, Nathaniel Kramer, Anne Co, Umit S. Ozkan</i>	
<b>(212d) Mechanistic and Trend Analyses of Selective Furfural Electroreduction on Transition Metals from First-Principles Methods</b> .....	348
<i>Nannan Shan, Xiaotong Chadderton, David Chadderton, Wenzhen Li, Bin Liu</i>	
<b>(212e) NO Electrochemical Reduction on Pt(100) from First Principles</b> .....	349
<i>Hee-Joon Chun, Vesa Apaja, Andre Clayborne, Karoliina Honkala, Jeffrey P. Greeley</i>	
<b>(212f) Flame Synthesis and High Pressure High Temperature Annealing of Anatase TiO<sub>2</sub> for Increased Photocatalytic Activity</b> .....	350
<i>Ashley M. Pennington, Katelyn A. Dagnall, Rachel A. Yang, Fuat E. Celik</i>	
<b>(212g) Photoelectrochemical Oxidation of Biorenewable Alcohols By Nitroxyl Radical Catalysts</b> .....	351
<i>David Chadderton, Ivy Wu, Matthew G. Panthani, Wenzhen Li</i>	
<b>(213a) Effect of Membrane on the Performance of a Hydrogen-Vanadium Regenerative Fuel Cell</b> .....	352
<i>Trung V. Nguyen, Regis Dowd, R. Wycisk, Peter N. Pintauro</i>	
<b>(213b) Dynamics of Anhydrous Proton Transport on the Surface of Functionalized Graphene</b> .....	353
<i>Abhishek Bagusetty, Pabitra Choudhury, Wissam A. Saidi, Bridget Derksen, Elizabeth Gatto, J. Karl Johnson</i>	
<b>(213c) Indirect and Direct Observation of Ionomer Colloidal Systems with Applications to Fuel-Cell Catalyst Layers</b> .....	354
<i>Kelsey Hatzell, Ahmet Kusoglu, Peter Dudenas, Nancy Kariuki, Deborah J. Myers, Adam Weber</i>	
<b>(213d) Multiscale Modeling of Polymer Electrolyte Membrane for Fuel Cell</b> .....	355
<i>Seung Soon Jang</i>	
<b>(213e) High Anion Conduction in Partially Fluorinated Multiblock Copolymers</b> .....	356
<i>Lisha Liu, John Ahlfield, Paul A. Kohl</i>	
<b>(213f) Anion Exchange Membranes for Fuel Cell Applications Based on Advanced Cations</b> .....	358
<i>Andrew M. Herring, Tara Pandey, Himahsu Sarode, Ye Liu</i>	
<b>(213g) Sustainion™ Membranes for Electrolyzers and Fuel Cells</b> .....	359
<i>Hongzhou Yang, Zengcai Liu, Robert Kutz, Syed Dawar Sajjad, Richard I. Masel</i>	
<b>(213h) Design and Development of Electrolyte Membranes for Solid Alkaline Fuel Cells</b> .....	360
<i>Takeo Yamaguchi, Shoji Miyanishi</i>	
<b>(213i) Membrane Electrolytes with Magnetic Field Aligned Graphene Oxide Nanosheets for Alkaline Fuel Cells</b> .....	361
<i>Shingjiang Jessie Lue</i>	

<b>(214a) Highly Thermal-Stable and Functional Cellulose Nanocrystals and Nanofibrils Produced Using Fully Recyclable Organic Acids.....</b>	<b>362</b>
<i>Junyong Zhu</i>	
<b>(214b) Two-Step Process to Create “Roll-Off” Superamphiphobic Paper Surfaces.....</b>	<b>363</b>
<i>Lu Jiang, Zhenguan Tang, Rahmat Clinton, Dennis W. Hess, Victor Breedveld</i>	
<b>(214c) 3D Printed Nanocellulosic Materials and Their Composite.....</b>	<b>364</b>
<i>Vincent Li, Yulin Deng, Hang Qi</i>	
<b>(214d) Modifying the Surface Properties of Wood Using ATRP Grafting Polymerization.....</b>	<b>365</b>
<i>Marta Vidiella del Blanco, Ingo Burgert, Etienne Cabane</i>	
<b>(214e) Synthesis of Cellulose-Based Injectable Hydrogel Composite for pH-Responsive Drug Delivery.....</b>	<b>366</b>
<i>Nusheng Chen, Zhaohui Tong</i>	
<b>(214f) Preparation of Whole Biomass Aerogels from Douglas Fir Using Molten Salt Hydrate As Solvent .....</b>	<b>367</b>
<i>Yang Liao, Xuejun Pan</i>	
<b>(216a) so<sub>2</sub> Interactions with Pt, Pd, and Pd-Pt/Al<sub>2</sub>O<sub>3</sub> Catalysts .....</b>	<b>368</b>
<i>William Epling, Monique Wilburn</i>	
<b>(216b) Insights into the Deactivation of Cu/SAPO-34 By Low- and High-Temperature Hydrothermal Treatment.....</b>	<b>369</b>
<i>Yang Zheng, Aiyong Wang, Eric D. Walter, Feng Gao, James Song, Yilin Wang, Janos Szanyi, Charles H. F. Peden</i>	
<b>(216c) Lean-Rich Switching over a Modified Three-Way Catalyst: Experiments and Modeling.....</b>	<b>370</b>
<i>Mengmeng Li, Sam Malamis, Michael P Harold, William S. Epling</i>	
<b>(216d) Importance of Exhaust Hydrocarbon Speciation in the Studies of Low-Temperature Emission Control Technologies for Next-Generation Fuel-Efficient Vehicles .....</b>	<b>372</b>
<i>Se H. Oh, Michelle Wiebenga, Sung Bong Kang, Sung Bang Nam, In-Sik Nam</i>	
<b>(216e) Rapidly Pulsed Reductants in Diesel NO<sub>x</sub> Reduction with Lean NO<sub>x</sub> Traps: Spatial Distribution of Species.....</b>	<b>373</b>
<i>Amin Reihani, Brent Patterson, John Hoard, Galen B Fisher</i>	
<b>(216f) A Rational Pathway for Generic Three-Way Catalyst Model Development in Stoichiometric Natural Gas Engines.....</b>	<b>375</b>
<i>Jian Gong, Di Wang, Junhui Li, Neal Currier</i>	
<b>(216g) Effects of Cu Density in Cu-SSZ-13 Zeolites on Low-Temperature NO<sub>x</sub> Selective Catalytic Reduction with NH<sub>3</sub>.....</b>	<b>376</b>
<i>Ishant Khurana, Atish A. Parekh, Jonatan Albarracin, Christopher Paolucci, Arthur Shih, John R. Di Lorio, W. Nicholas Delgass, Jeffrey T. Miller, William Schneider, Rajamani Gounder, Fabio H. Ribeiro</i>	
<b>(216h) The Effects of Catalyst Aging on Sulfur Degradation over Fully Formulated Lean NO<sub>x</sub> Trap Catalysts .....</b>	<b>377</b>
<i>Travis Wentworth, Louise Olsson, Marie Stenfeldt</i>	
<b>(216i) A Comparative Study of ZSM-5 and BEA-Zeolites for Hydrocarbon Trap Applications Under “Cold-Start” Conditions .....</b>	<b>378</b>
<i>Eleni A. Kyriakidou, Jae-Soon Choi, Todd J. Toops, James E. Parks</i>	
<b>(225a) Combined Experimental and Modeling Approach to Triboelectric Charging of Polyethylene Powders .....</b>	<b>379</b>
<i>Ladislav Konopka, Simon Jantac, Juraj Kosek</i>	
<b>(225b) The Influence of Surface Chemistry on the Electrostatic Properties of Particles.....</b>	<b>380</b>
<i>Karolina Biegaj, Tim Lukas, Martin Rowland, Jerry Heng</i>	
<b>(225c) Catastrophic Failure of Agitated Filter-Driers Due to Triboelectric Charging of Certain APIs.....</b>	<b>382</b>
<i>Athanas Koynov, Adam Fine, Luke Schenck</i>	
<b>(225d) Comparison of Magnetically Assisted Impaction Coating (MAIC) with Traditional Mixing Techniques for the Addition of a Silica Flow Aid .....</b>	<b>383</b>
<i>Tim Freeman, Willie Hendrickson, Charles Bowman, Chris Rueb, Robert Bowman, Katrina Brockbank, Jamie Clayton</i>	
<b>(225e) Surface Chemical Modification and Its Effect on Dynamic Flow Properties.....</b>	<b>391</b>
<i>Camila Garcia Jange, Rose Prabin Kingsly Ambrose</i>	
<b>(225f) Effect of Surface Roughness and Particle Size on Wall Friction .....</b>	<b>392</b>
<i>Defne Kayrak-Talay, Karl Jacob, James F. Koch</i>	
<b>(235a) Extracting Kinetic Parameters from TGA Datasets - Ensuring Optimal Outcomes for Cellulose Pyrolysis .....</b>	<b>393</b>
<i>Michael Adenson, Joseph Biernacki, Matthew D. Kelley, Osama Elkelay</i>	
<b>(235b) The Influence of Potassium Content and Heating Rate on Biomass Pyrolysis .....</b>	<b>394</b>
<i>Anker D. Jensen, Anna Trubetskaya, Kentaro Umeki</i>	

<b>(235c) Synthesis and Characterization of Maleic Acid – Aluminum Catalyst for Glucose Conversion</b> .....	395
<i>Amanda Kreger, Ximing Zhang, Nathan S. Mosier</i>	
<b>(235d) Catalytic Hydropyrolysis of Milled Lignins Derived from Hardwood, Softwood and Herbaceous Biomass Using Bifunctional Catalysts</b> .....	396
<i>Xianglan Bai</i>	
<b>(235e) Inhibition Effect During Catalyzed Biomass Char Gasification in Steam and Carbon Dioxide and Its Reversal</b> .....	397
<i>Mohmed Akil Syed, Ildar Musin, John D. Muzzy, Derrick W Flick, Carsten Sievers, Pradeep K. Agrawal</i>	
<b>(235f) Acetone Condensation Over Ion-Exchanged Hydroxyapatite Catalysts</b> .....	398
<i>Christopher R. Ho, Alexis T. Bell</i>	
<b>(240a) U.S. Power System Outlook: A Range of Perspectives From a Suite of Standard Scenarios</b> .....	399
<i>Wesley Cole, James Richards</i>	
<b>(240b) Economics and Dynamic Flexibility of Concentrated Solar Power Technologies</b> .....	400
<i>Alexander W. Dowling, Ana Dyreson, Victor M. Zavala</i>	
<b>(240c) Leveraging Storage and Hybridization to Maximize Renewable Utilization</b> .....	401
<i>Kevin Ellingwood, Jacob Tuttle, Kody M. Powell</i>	
<b>(240d) State of Health Estimation Method Design for Energy Storage System of Lithium Ion Battery and Comparative Study: From Cell to Demonstration Sites</b> .....	402
<i>Keonhee Park, Jaeheum Jung, Chonghun Han</i>	
<b>(240e) The Effect of Centralized Energy Storage on an Integrated Distributed Photovoltaics/CHP System for District Power, Heating and Cooling</b> .....	403
<i>Abigail Ondeck, Thomas F. Edgar, Michael Baldea</i>	
<b>(240f) Reducing the Cost of Operational Water in Military Water Systems: A Data-Driven Modeling and Optimization Study</b> .....	404
<i>Corey James</i>	
<b>(240g) Energy Demand Management in Process Systems Subject to Time-Varying Electricity Prices: A Decomposition-Based Approach</b> .....	405
<i>Chudong Tong, Ahmet Palazoglu, Nael H. El-Farra</i>	
<b>(242a) New World of Opportunity Crudes</b> .....	406
<i>Tim Olsen</i>	
<b>(242b) Effect of Nanoporous Monoliths on Saturation Pressure in Shale Reservoirs</b> .....	407
<i>Heyyoung Cho, Dominic Caputo, Alberto Martinez, Milind Deo</i>	
<b>(242c) Forecasting Gas-Oil Ratios and Solution Gas Production from Liquid Rich Shale Reservoirs</b> .....	408
<i>Ibukun Makinde, Michael Nikolaou</i>	
<b>(242e) Solvent Extraction for Bitumen Recovery from Oil Sands Ores</b> .....	409
<i>Junyan Wang, Lin He, Hong Sui, Xingang Li</i>	
<b>(242g) Short Residue to Useful Products: Different Pathways</b> .....	410
<i>Utsav Shukla, Utkarsh Maheshwari</i>	
<b>(261b) Production of Light Olefins from Protein-Rich Microalgae By Hydrothermal Liquefaction and Sequential Catalytic Cracking</b> .....	411
<i>Yoshiaki Hirano, Yuka Kasai, Kunimasa Sagata, Yuichi Kita</i>	
<b>(261c) Selective Adsorption of Au (III) By Epichlorohydrin/Thiourea Modified Porous Alginate Beads</b> .....	412
<i>Xiangpeng Gao, Yan Zhang, Yuming Zhao</i>	
<b>(261g) Hydrothermal Carbonization of FOOD Wastes from LOCAL Eatery</b> .....	413
<i>M.Toufiq Reza, Kyle McGaughy, Md. Golam Rasul</i>	
<b>(261e) Production of Jet Fuel and Butadiene from Lignocellulose and Lignocellulosic Platform Chemicals</b> .....	414
<i>Xingkai Cui, Xuebing Zhao, Dehua Liu</i>	
<b>(261i) Macroalgae Pretreatment Using Peg-Linked Dicationic Acidic Ionic Liquids</b> .....	415
<i>Lenny B. Malihan, Neha Mittal, Grace M. Nisola, Teklebrahan G. K. Weldemhret, Wook-Jin Chung, Chosel P. Lawagon</i>	
<b>(261h) Fast Pyrolysis Bio-Oil As Precursor of Thermosetting Resins</b> .....	416
<i>Mehul Barde, Bernal Sibaja Hernandez, Maria Auad</i>	
<b>(261k) Micro/Nano Lignocellulosic Fibrils (MNLCF) Aerogels from Coconut and Oil Palm Tree Residuals and Application for Environmental Remediation</b> .....	417
<i>Anurodh Tripathi, Ana Ferrer, Saad A. Khan, Orlando J. Rojas</i>	
<b>(275a) High Concentration Glucose Production from CELF Pretreated Corn Stover Using Wild Type Clostridium Thermocellum Supplemented with <math>\beta</math>-Glucosidase</b> .....	418
<i>Christian Alcaraz, Rajevee Kumar, Charles M. Cai, Charles Wyman</i>	

<b>(275b) Switchgrass Solubilization By Mixed Methanogenic Enrichments with Comparison to Pure Cultures of Clostridium Thermocellum</b> .....	419
<i>Xiaoyu Liang, Xiongjun Shao, Evert K. Holwerda, Liang Tian, Tom L. Richard, John M. Regan, Jason M. Whitham, Dawn M. Klingeman, Steven D. Brown, Lee R. Lynd</i>	
<b>(275c) Substituent Effect of Phenolic Aldehydes Inhibition on Alcoholic Fermentation By Saccharomyces Cerevisiae</b> .....	420
<i>Maobing Tu, Rui Xie, Thomas Elder</i>	
<b>(275e) Enzymatic Process for Making Plasticizers from High Oleic Soybean Oil</b> .....	421
<i>Julia Burchell, Sara Duque Martinez, Ximing Zhang, Nathan S. Mosier</i>	
<b>(275f) Biomass Blending &amp; Densification: Impacts on Biochemical Conversion Performance</b> .....	422
<i>Allison E. Ray, Chenlin Li, Vicki S. Thompson, Dayna Daubaras, Nicholas J. Nagle</i>	
<b>(276a) Tuning Ionic Liquids for Low Cost: Applications in Lignocellulose Deconstruction</b> .....	423
<i>Jason P. Hallett</i>	
<b>(276b) Investigation of Lignin Streams Generated during Ionic Liquid Pretreatment of Lignocellulosic Biomass</b> .....	424
<i>Tanmoy Dutta, Gabriella Papa, Jian Sun, Nancy Isern, John R Cort, Blake A. Simmons, Seema Singh</i>	
<b>(276c) Swelling and Dissolution of Cellulosic Fibers: Effect of Crystallinity and Fiber Diameter</b> .....	425
<i>Mohammad Ghasemi, Marina Tsianou, Paschalis Alexandridis</i>	
<b>(276f) Towards a New Paradigm in the Ionic Liquid Pretreatment for the Production of Lignocellulosic Biofuels: Technoeconomic Insights</b> .....	431
<i>N.V.S.N. Murthy Konda, Seema Singh, Feng Xu, Jian SUN, Blake Simmons, Corinne D. Scown</i>	
<b>(281a) Effect of Alcohol Structure on the Kinetics and Mechanism of Acid Catalyzed Etherification and Unimolecular Dehydration over Tungstated Zirconia</b> .....	432
<i>Julie Rorrer, Alexis T. Bell, Dean Toste</i>	
<b>(281b) Pathways to Selectively Form Individual Aromatic Products from Ethanol</b> .....	433
<i>David W. Flaherty, Takahiko Moteki</i>	
<b>(281c) Combined Experimental and Theoretical Study of Ethanol Catalytic Conversion to 1,3-Butadiene on MgO</b> .....	434
<i>William Taifan, Jonas Baltrusaitis</i>	
<b>(281d) Aldol Condensation of Acetaldehyde Over Titania, Hydroxyapatite and Magnesia</b> .....	435
<i>Zachary Young, Sabra Hanspal, Robert J. Davis</i>	
<b>(281e) Single Step Conversion of Short Carboxylic Acid Mixtures Obtained from Fermentation to Aromatics and <math>\alpha</math>-Olefins over a Cu/ZrO<sub>2</sub> Catalyst</b> .....	436
<i>Bartosz Rozmyslowicz, Jeremy S. Luterbacher</i>	
<b>(281f) Mechanistic Insights on the Formation of Maleic Anhydride from the Oxidation of Levulinic Acid over Supported Vanadates</b> .....	437
<i>Anargyros Chatzidimitriou, Jesse Q. Bond</i>	
<b>(281g) P-Toluic Acid from Biomass-Derived Coumalic Acid: A Reaction Network Analysis</b> .....	438
<i>Toni Pfennig, Robert L. Johnson, Brent H. Shanks</i>	
<b>(281h) Rational Design of Nanoflower Shaped Bimetallic Ptmn Nanocatalysts for Tartronic Acid Synthesis from Biomass</b> .....	439
<i>Xin Jin, Meng Zhao, Chun Zeng, Wenjuan Yan, Honghong Shi, Prem Thapa, Bala Subramaniam, Raghunath V. Chaudhari</i>	
<b>(288a) Upgrading Corn Stover Pretreatment Wastes into Biodiesel Via Oleaginous Rhodococci</b> .....	440
<i>Arthur J. Regauskas</i>	
<b>(288b) Biological Design of Lignin Conversion</b> .....	441
<i>Bin Yang, Art Regauskas, Joshua Yuan</i>	
<b>(288c) Selective Conversion of Guaiacol to Substituted Alkylphenols in Supercritical Ethanol over MoO<sub>3</sub></b> .....	442
<i>Kai Cui, Yongdan Li</i>	
<b>(288d) Enabling Microbial Utilization of Thermally Depolymerized Lignin Monomers</b> .....	443
<i>Kirsten Davis, Marjorie Rover, Davinia Salvachua, Gregg T. Beckham, Zhiyou Wen, Ryan Smith, Laura Jarboe, Robert Brown</i>	
<b>(288e) Fractionated Lignin Rheology and Structure</b> .....	444
<i>Christopher Higgins, David C. Russ, Noppadon Sathitsuksanoh, R. Eric Berson</i>	
<b>(288f) Selective Conversion of Biomass-Derived Lignin to Cyclic Hydrocarbons</b> .....	445
<i>Bin Yang, Melvin Tucker, Hongliang Wang, Hao Ruan, Xiaowen Chen</i>	
<b>(289b) The Evolution of Multi-Functional Nanoporous Metal Composite Electrocatalysts</b> .....	446
<i>Joshua Snyder, Yawei Li</i>	
<b>(289c) Effect of Doping on the Activity of Nickelate Oxides Toward Surface Oxygen Exchange and Oxygen Reduction</b> .....	447
<i>Xiang-Kui Gu, Anirban Das, Juliana S. A. Carneiro, Eranda Nikolla</i>	



<b>(289d) Oxyhydroxides As a Platform for Confined Oxygen Electrochemistry</b> .....	448
<i>Andrew Doyle, Michal Bajdich, Aleksandra Vojvodic</i>	
<b>(289e) Large-Size Graphene Tube Catalysts for Bifunctional Oxygen Reduction and Oxygen Evolution Electrocatalysis in Alkaline Media</b> .....	449
<i>Gang Wu</i>	
<b>(289f) Atomic Layer Deposition of NiAl<sub>x</sub>O<sub>y</sub> Catalysts for Electrochemical Oxidation of Water</b> .....	450
<i>Jonathan G. Baker, Stacey F. Bent, A.J.M. Mackus</i>	
<b>(289g) The Role of Superoxide in the Non-Aqueous Oxygen Reduction Reaction in Li-O<sub>2</sub> Batteries</b> .....	451
<i>William C. McKee, Saurin Rawal, Ye Xu</i>	
<b>(310a) Developing Structure-Property Relationships Between Reactant Structures, Ionic Liquids, and Reaction Rate Constant</b> .....	452
<i>Vikrant Dev, Nishanth G. Chemmangattuvalappil, Mario Richard Eden</i>	
<b>(310b) Reverse Design of Ionic Liquids for CO<sub>2</sub> Absorption</b> .....	453
<i>Sarah Davis, Mario Richard Eden</i>	
<b>(310c) Application of Systematic Methodology for Design of Tailor-Made Blended Products: Lubricant Design</b> .....	454
<i>Marina Fedorova, Laurent Grosset, Zhou Fang, Rafiqul Gani</i>	
<b>(310d) Physical Properties for Lipids Based Process and Product Design</b> .....	455
<i>Olivia Ana Perederic, Sawitree Kalakul, Bent Sarup, John M. Woodley, Rafiqul Gani</i>	
<b>(310e) An Extension of COSMO-Based Methodologies for Computer-Aided Mixture Design</b> .....	456
<i>Nick Austin, Nick Sahinidis, Daniel W. Trahan</i>	
<b>(310f) A Mixed-Integer Linear Programming Approach for the Design of Nanostructured Catalysts</b> .....	457
<i>Christopher L. Hanselman, Chrysanthos E. Gounaris</i>	
<b>(310g) First-Principles Rheological Modelling of Smart Drilling Nanofluids</b> .....	459
<i>Simon Reilly, Zisis Vryzas, Vassilios C. Kelessidis, Dimitrios I. Gerogiorgis</i>	
<b>(310h) Modelling the Deposition of Actives on Cotton Fabrics During the Washing Process</b> .....	460
<i>Laura Bueno, Carlos Amador, Serafim Bakalis</i>	
<b>(312a) Progress in Electro Acoustic Signal Analysis</b> .....	463
<i>Dan Steingart</i>	
<b>(312b) Model-Assisted Development of Microfabricated 3D Ni(OH)<sub>2</sub> Electrodes with Rapid Charging Capabilities</b> .....	464
<i>Chenpeng Huang, Andac Armutlulu, Sue Ann Bidstrup Allen, Mark G. Allen</i>	
<b>(312c) Electrode-Supported Macroporous Ceramic Membrane Separator for Lithium Ion Batteries</b> .....	465
<i>Jerry Y.S. Lin, Gaurav Sharma, Yi Jin</i>	
<b>(312d) First-Principles Density Functional Theory Modeling of Li Binding: Thermodynamics and Redox Properties of Quinone Derivatives for Lithium-Ion Batteries</b> .....	466
<i>Ki Chul Kim, Tianyuan Liu, Seung Woo Lee, Seung Soon Jang</i>	
<b>(312e) Conductivity Degradation of Polyvinylidene Fluoride Binder during Cycling: Measurements and Simulations for Lithium-Ion Batteries</b> .....	467
<i>Anne M. Grillet, Thomas Humplik, Emily K. Stirrup, Dave A. Barringer, Scott A. Roberts, Chelsea Snyder, Madison R. Janvrin, Christopher A. Apblett</i>	
<b>(312f) Polymeric Electrolyte Additives for Suppressing Zinc Dendrite Formation in Rechargeable Batteries with Zinc Anodes</b> .....	468
<i>Stephen J. Banik, Karun K. Rao, Rohan Akolkar</i>	
<b>(319a) Managing Trade-Offs Between Food, Renewable Energy and Ecosystem Services</b> .....	469
<i>Rebecca Hanes, Varsha Gopalakrishnan, Bhavik R. Bakshi</i>	
<b>(319b) Efficient Solar Thermal Hydrogen, Electricity and Fresh Water Coproduction Process Synthesis</b> .....	470
<i>Emre Gençer, Rakesh Agrawal</i>	
<b>(319c) Food-Energy-Water Nexus: Modeling Energy and GHG Emissions of Water Embodied in U.S. Domestic Food Transfers</b> .....	471
<i>Nemi Vora, Apurva Shah, Vikas Khanna</i>	
<b>(319d) Water Footprint of Hydrotreated Renewable Jet Fuel Produced through Rapeseed Rotation with Wheat and Other Crops in North Dakota</b> .....	472
<i>Rui Shi, David W. Archer, Suchada Ukaew, Kristin C. Lewis, David R. Shonnard</i>	
<b>(319e) NexSym – A Local Nexus Simulation System</b> .....	473
<i>Elias Martinez Hernandez, Melissa Leung Pah Hang, Matthew Leach, Aidong Yang</i>	
<b>(319f) Gibbsian Game Theory for Tragedy of the Commons Problems in Food-Energy-Water Sustainability</b> .....	474
<i>Darrell Velegol</i>	

<b>(319g) Water and Energy Systems in Sustainable City Development: Agent-Based Modelling and Resource Technology Optimization .....</b>	<b>475</b>
<i>Xiaonan Wang, Koen H. van Dam van Dam, Charalampos Triantafyllidis, Rembrandt Koppelaar, Nilay Shah</i>	
<b>(337a) Biodiesel Produced from Soybean Oil with the Two Flow Reactors in Series .....</b>	<b>476</b>
<i>David Baah, Nader Vahdat, Kyung Kwon</i>	
<b>(337b) Biomass Conversion to Acrylonitrile Monomer-Precursor for Production of Carbon Fibers .....</b>	<b>477</b>
<i>Jadid Samad, Lindsey Chatterton, Zora Govedarica, Amit Goyal</i>	
<b>(337c) Catalytic Conversion of Polyols to Olefins .....</b>	<b>478</b>
<i>Bryan E. Sharkey, Friederike C. Jentoft</i>	
<b>(337d) Catalytic Oligomerization of Ethylene: Experimental Insight into the Effect of Supercritical Reaction Conditions.....</b>	<b>479</b>
<i>Oliver Jan, Fernando Resende</i>	
<b>(337e) Mesoporous Catalysts for Conversion of 2,3-Butanediol to Butene .....</b>	<b>480</b>
<i>Quanxing Zheng, Jason Grossardt, Haider Almkhelfe, Jiayi Xu, Brian P. Grady, Placidus B. Amama, Keith L. Hohn</i>	
<b>(337g) Polar Aprotic Solvent Effects on the Catalytic Conversion of Fructose to 5-(Hydroxymethyl)Furfural or Lactic Acid.....</b>	<b>481</b>
<i>Christian G. Rivera-Goyco, Michelle M. Marrero-Vazquez, Leida M. Vazquez-Ramos, Yomaira J. Pagan-Torres, Nelson Cardona-Martinez</i>	
<b>(343a) High-Efficiency Electrochemical Conversion of CO<sub>2</sub> to Value Added Fuels Current Status, Challenges, and Future Directions .....</b>	<b>482</b>
<i>Xiao-Dong Zhou</i>	
<b>(343b) Design and Economic Analysis of IGCC Power Plants with CO<sub>2</sub> Capture .....</b>	<b>483</b>
<i>Umer Zahid, Usama Ahmed, Chonghun Han</i>	
<b>(343c) Optimization of the CCS Network Under Harsh Geographical Conditions, Using GIS and MINLP Modeling.....</b>	<b>484</b>
<i>Changsoo Kim, Kyeongsu Kim, Chonghun Han</i>	
<b>(343d) Amine-Blends Screening and Characterization for CO<sub>2</sub> Post-Combustion Capture .....</b>	<b>485</b>
<i>Abdullah Al Hinai, Mohammad Abu Zohra, Dang Viet Quang</i>	
<b>(343e) Economic and Exergy Analysis of Integrated Purification Process with Carbon Capture Process (CCP) Using Selexol in a 500 MW Integrated Gasification Combined Cycle (IGCC) Power Plant.....</b>	<b>491</b>
<i>Woo-Sung Lee, Hyun-Taek Oh, Chang-Ha Lee</i>	
<b>(343g) Influence of Alloying on CO<sub>2</sub> Electroreduction on Ag-Zn System .....</b>	<b>492</b>
<i>Toru Hatsukade, Kendra P. Kuhl, Etosha R. Cave, David N. Abram, Jeremy T. Feaster, Christopher Hahn, Anna L. Jongorius, Thomas F. Jaramillo</i>	
<b>(343i) In-Situ Infrared Spectroscopic Investigation of Pyridine-Mediated CO<sub>2</sub> Reduction on Pt Electrocatalysts.....</b>	<b>493</b>
<i>Marco Dunwell, Bingjun Xu, Yushan Yan</i>	
<b>(348a) Investigations of Surface Chemistry for Pyridine-Catalyzed CO<sub>2</sub> Reduction on Gallium Phosphide .....</b>	<b>494</b>
<i>Coleman Kronawitter, Bruce E. Koel</i>	
<b>(348b) Implications of Surface Reconstructions Impacting Py-Catalyzed CO<sub>2</sub> Reduction on Semiconductor Photoelectrodes.....</b>	<b>495</b>
<i>Thomas P. Senfite, Emily A. Carter</i>	
<b>(348c) Activity and Stability of Pure and Modified Cooh for Oxygen Evolution Reaction in Alkaline Medium.....</b>	<b>496</b>
<i>Zhu Chen, Coleman Kronawitter, Yao-wen Yeh, Xiaofang Yang, Peng Zhao, Yao Nan, Bruce Koel</i>	
<b>(348d) Fe-Ni Core-Shell Hydroxide Nanoparticles As an Active Oxygen Evolution Reaction (OER) Catalyst.....</b>	<b>497</b>
<i>Stephanie Candelaria, Nikki S. Rentz, Lauren F. Greenlee</i>	
<b>(348e) Layered - Hyperthin Electrocatalysts for the Water Splitting Reactions .....</b>	<b>498</b>
<i>Kevin C. Leonard</i>	
<b>(348f) Stabilizing Electrodeposited Nanoparticle Electrocatalysts on Si MIS Photocathodes for Solar Water Splitting.....</b>	<b>499</b>
<i>Natalie Labrador, Xinxin Li, Yukun Liu, Jeffrey T Koberstein, Daniel V. Esposito</i>	
<b>(348g) Two Distinct Types of Surface-Bound Atomic Hydrogen and Their Role in Dictating Product Selectivity in Artificial Photosynthesis Reactions .....</b>	<b>500</b>
<i>Samiksha Poudyal, Siris Laursen</i>	
<b>(353b) Plasmon-Enhanced Photocatalytic CO<sub>2</sub> Reduction on Nanostructured Composite Electrodes.....</b>	<b>501</b>
<i>Elizabeth Corson, Erin Creel, Youngsang Kim, Fen Qiu, Robert Kostecki, Jeffrey Urban, Bryan D. McCloskey</i>	

<b>(353c) Photon, Electron, and Ion Management in Artificial Photosynthesis: Realizing Efficient Renewable Energy to Fuel Conversion .....</b>	<b>502</b>
<i>Ke Sun, Xinghao Zhou, Fadl Saadi, Ivan Moreno-Hernandez, Yanjin Kuang, Erik Verlage, Jimmy John, Matthew Shaner, Shu Hu, Matthew McDowell, Chengxiang Xiang, Bruce S. Brunenschwig, Charles Tu, Nathan S. Lewis</i>	
<b>(353d) Tandem Core-Shell Si-Ta<sub>3</sub>N<sub>5</sub> Photoanodes for Photoelectrochemical Water Oxidation .....</b>	<b>503</b>
<i>Ieva Narkeviciute, Pongkarn Chakthranont, Christopher Hahn, A.J.M. Mackus, Stacey F. Bent, Thomas F. Jaramillo</i>	
<b>(353e) Heterostructured c-Si/BiVO<sub>4</sub> Core-Shell Tandem Photoanode for Unassisted Photoelectrochemical Water Splitting .....</b>	<b>504</b>
<i>Pongkarn Chakthranont, Thomas R. Hellstern, Joshua McEnaney, Thomas F. Jaramillo</i>	
<b>(353f) The Fabrication of Cu<sub>2</sub>O/g-C<sub>3</sub>N<sub>4</sub>/WS<sub>2</sub> Triple-Layered Photocathode for Photoelectrochemical Hydrogen Evolution.....</b>	<b>505</b>
<i>Xintian Xu, Yuanzhi Zhu, Xiaobin Fan, Guoliang Zhang, Wenchao Peng</i>	
<b>(355a) Sustainable System Synthesis and Analysis using a Novel Sustainability Concept.....</b>	<b>506</b>
<i>Masih Jorat, Vasiliou Manousiouthakis</i>	
<b>(355b) Systematic Approach Towards Establishing Thermodynamic Principles of Sustainable Coupled Industrial-Natural Systems (CINS).....</b>	<b>507</b>
<i>Shweta Singh</i>	
<b>(355c) Analysis of United Nations Clean Development Mechanism Carbon Emission Reduction Projects from a Life Cycle Assessment Perspective .....</b>	<b>508</b>
<i>Tamara Chernomordik, Arunprakash T. Karunanithi</i>	
<b>(355d) Evolution and Robustness of the Global Agricultural-Phosphorus Trade Network .....</b>	<b>509</b>
<i>Andrew Beck, Carla Ng, Vikas Khanna</i>	
<b>(355e) A Framework for Considering Synergies Between Nature and Engineering from Process to Planetary Scales .....</b>	<b>510</b>
<i>Xinyu Liu, Tapajyoti Ghosh, Varsha Gopalakrishnan, Bhavik R. Bakshi</i>	
<b>(365a) Tungsten Oxide Decorated Zinc Telluride for the Photoelectrochemical Water Splitting .....</b>	<b>511</b>
<i>Chengeto Kazuva, Rekisha Pootoon, Jonathan Mbah</i>	
<b>(365b) Molybdenum Silicide and Disulfide Protection Schemes for Silicon Photocathodes .....</b>	<b>512</b>
<i>Laurie A King, Thomas R. Hellstern, Thomas F. Jaramillo</i>	
<b>(365c) Utility of Dual-Layer Photoanode for Photoelectrochemical Biomass Conversion.....</b>	<b>513</b>
<i>Ivy Wu, David Chadderton, Wenzhen Li, Matthew G. Panthani</i>	
<b>(365d) Molybdenum Disulfide As a Protection Layer and Catalyst for Gallium Indium Phosphide Solar Water Splitting Photocathodes .....</b>	<b>514</b>
<i>Reuben J. Britto, Jesse D. Benck, James L. Young, Todd G. Deutsch, Christopher Hahn, Thomas F. Jaramillo</i>	
<b>(365e) Bioelectricity Generation from a Carbon Soot Electrode Using a Paper Based Microbial Fuel Cell .....</b>	<b>515</b>
<i>Ramya Veerubhotla, Saikat Chakraborty, Debabrata Das</i>	
<b>(365f) Sustainable Power Sources Based on High Efficiency Thermopower Wave Devices.....</b>	<b>516</b>
<i>Albert Tianxiang Liu, Sayalee G. Mahajan, Anton Cottrill, Yuichiro Kunai, Stephen Gibbs, Michael Strano</i>	
<b>(365g) Nanostructuring, Oxygen Anion Diffusion Study and Electrochemical Performance of Double Perovskite Electrode for SOFC .....</b>	<b>517</b>
<i>M. Ali Haider, Uzma Anjum</i>	
<b>(365h) Application of Photosystem I Multilayer Films for Photovoltage Enhancement in Aqueous Natural Dye Sensitized Solar Cells.....</b>	<b>518</b>
<i>Maxwell Robinson, Marie Armbruster, David Cliffl, G. Kane Jennings</i>	
<b>(365i) Compositions and Structures of High-N-Content Mesoporous Carbon Oxygen Reduction Electrocatalysts .....</b>	<b>519</b>
<i>Niels Zussblatt, Nina Fechler, Markus Antonietti, Bradley F. Chmelka</i>	
<b>(371a) Invited - Solar Light NO Removal By Flame-Made Sub-Nano Pd Clusters on Nano-TiO<sub>2</sub> .....</b>	<b>520</b>
<i>Sotiris E. Pratsinis</i>	
<b>(371b) Visible Light Photocatalytic Degradation of Organic Pollutant Using N Doped TiO<sub>2</sub> Nanoparticles Synthesized By One Step Liquid Flame Aerosol Method (LFSP) .....</b>	<b>521</b>
<i>Siva Nagi Reddy Inturi, Thirupathi Boningari, Makram Suidan, Panagiotis Smirmiotis</i>	
<b>(371c) Invited - DNA Encapsulated within Silica Nanoparticles for Environmental Monitoring and Tracing .....</b>	<b>522</b>
<i>Robert N. Grass, Wendelin J. Stark</i>	
<b>(371d) Textile Dye Removal from Water Using Catalytic Nanoparticle-Carbon Composites .....</b>	<b>523</b>
<i>Lauren F. Greenlee, Skylar Watson, Sheldon Shinn, Kathryn Lawrence, Katherine Younglove, Andrew M. Herring, Mei-Chen Kuo</i>	

<b>(371e) Grafted Nanopyroxene for the Removal of Polar Organic Compounds from Produced Wastewater</b> .....	524
<i>Ghada Nafie, Nashaat Nassar, Gerardo Vitale</i>	
<b>(371f) Invited-2D Materials for Packaging and As Nanoparticle-Surfactants</b> .....	525
<i>Zhengdong Cheng</i>	
<b>(371g) Ionophore-Decorated Magnetic Graphene Oxide As a Composite Adsorbent for Precious Metal Recovery</b> .....	526
<i>Khino J. Parohinog, Grace M. Nisola, Russel J. Galanido, Wook-Jin Chung</i>	
<b>(373b) Developing and Piloting Robust Downstream Processes to Utilize Variable Composition and Blended Biomass Feedstocks</b> .....	527
<i>Todd Pray</i>	
<b>(373c) A Review of Minor Feedstock Characteristics that Have a Major Impact on Process Design and Commercial Success</b> .....	528
<i>Dale Monceaux</i>	
<b>(373d) Innovative Solutions to Feedstock Supply System Challenges Faced by Biorefineries: the U.S. Department of Energy's Feedstock Supply and Logistics Program</b> .....	529
<i>Alison Goss Eng</i>	
<b>(379c) Aquathermolysis of Waste Triglycerides in a Continuous Flow Reactor for Jet Fuels Production</b> .....	530
<i>Sandeep Kumar, Maoqi Feng, Alexander Asiedu</i>	
<b>(379d) Rheology of Biomass Slurries to Determine Pumpability for Hydrothermal Liquefaction</b> .....	531
<i>C. Luke Williams, Tyler L. Westover, Austin C. Matthews, Sergio Hernandez</i>	
<b>(379e) The Upgrading of Biomass-Derived Dimethyl Ether to High-Octane Hydrocarbons: The Effect of Process Conditions on Catalyst Performance</b> .....	532
<i>Connor Nash, Mayank Behl, Earl Christensen, Joshua A. Schaidle, Jesse E. Hensley, Daniel A. Ruddy</i>	
<b>(379f) A System-Level Analysis on Biomass Thermal Fractionation and Catalytic Upgrading Processes</b> .....	533
<i>Jeffrey A. Herron, Wangyun Won, Daniel E. Resasco, Steven Crossley, Christos T. Maravelias</i>	
<b>(380a) Performance of a Bench-Scale Continuous Hydrothermal Carbonization Reactor</b> .....	534
<i>M.Toufiq Reza, Charles Coronella, Akkrum Nasr</i>	
<b>(380b) Spectroscopic and Thermal Characterization of Carbonized Food Wastes</b> .....	535
<i>Avery Brown, Michael T. Timko</i>	
<b>(380c) Drying and Pyrolysis of Solid Waste on Spacecraft for Water Recovery and Biochar</b> .....	536
<i>Catherine E. Brewer, Sarah Lyons, Nayan Bhakta, Jacey Payne, KC Carroll</i>	
<b>(380d) Evaluating Physical and Electronic Structure Developments of Loblolly Pine Derived Biochar and Activated Carbon</b> .....	537
<i>Seunghyun Yoo, Junyeong Park, Wei Gao, Steve Kelley, Sunkyu Park</i>	
<b>(380e) Characterization of Free Radicals By Electron Spin Resonance Spectroscopy in Biochars from Pyrolysis at High Heating Rates and at High Temperatures</b> .....	538
<i>Anna Trubetskaya, Anker D. Jensen, Mogens Larsen Andresen, Søren Talbro Barsberg</i>	
<b>(386a) Shallexenvironment: A Multi-Disciplinary Effort to Assess the Environmental Implications for Shale Gas Exploration Ad Production in Europe</b> .....	539
<i>Alberto Striolo, Adrian Jones</i>	
<b>(386b) Study on Cold Energy Utilization System at Lcng Fueling Stations</b> .....	540
<i>Shilong Xu, Wensheng Lin</i>	
<b>(386c) Techno-Economic Analysis of Shale Gas-to-Dimethyl Ether (DME) Process Via Direct Synthesis</b> .....	541
<i>Chirag Mevawala, Yuan Jiang, Debangsu Bhattacharyya</i>	
<b>(386d) Thermodynamic Modeling of Produced Water with Electrolyte NRTL Model: Aqueous Sr<sup>2+</sup>-Na<sup>+</sup> -SO<sub>4</sub><sup>2-</sup>- Cl<sup>-</sup> Quaternary System</b> .....	542
<i>Soraya Honarparvar, Danny Reible, Chau-Chyun Chen</i>	
<b>(386e) Ethane/Ethylene Liquefaction – Cutting Edge Processes to Take the Fuel to the World</b> .....	543
<i>Adrian Wegmann, Kathy Bigger, Thomas Walter</i>	
<b>(386g) Absorption of Mixed Refrigerant in Lubricant Oil</b> .....	551
<i>Yang Song, Wensheng Lin</i>	
<b>(403a) All Biomass Is Local: Paying Farmers More for Cellulosic Biomass Is a Game Changer</b> .....	552
<i>Leonardo D. Sousa, Seungdo Kim, Bruce E. Dale</i>	
<b>(403c) Impact of Alkaline Deacetylation and Pelleting of Corn Stover at the Depot</b> .....	553
<i>John E. Aston, David N. Thompson</i>	
<b>(403d) Liquefaction of Lignocellulose</b> .....	554
<i>Neal Hengge, Daehwan Kim, Nathan S. Mosier, Youngmi Kim, Eduardo Ximenes, Michael R. Ladisch, Fernanda Cunha, A. C. Badino, Cristiane Sanchez Farinas</i>	

<b>(403e) Technoeconomic Analysis of Pyrolysis and Electrocatalysis Depots .....</b>	<b>555</b>
<i>Christopher M. Saffron, Peyman Fasahati, Sabyasachi Das, Mahlet Garedew-Ballard, James E. Jackson</i>	
<b>(403f) Electrochemical Bio-Oil Stabilization As an Alternative for Distributed Processing of Biomass .....</b>	<b>556</b>
<i>Luis A. Diaz, Tedd Lister, Asanga B Padmaperuma, Michael A. Lilga</i>	
<b>(408a) Chemical Looping Combustion for Carbon Capture Efficiency .....</b>	<b>557</b>
<i>Rosario Porrazzo, Graeme White, Joan Cordiner, Raffaella Ocone</i>	
<b>(408b) Cold Flow Model Studies of a Counter-Current Moving Bed Syngas Chemical Looping Pilot Unit for High Purity Hydrogen and Electricity Co-Generation with Carbon Capture .....</b>	<b>558</b>
<i>Dawei Wang, Andrew Tong, Liang-Shih Fan</i>	
<b>(408c) Development of a Carbon Stripper Particle Separation System for Chemical Looping Applications .....</b>	<b>559</b>
<i>Ronald W. Breault, Steven Rowan, Richard Stehle, Michael Bobek</i>	
<b>(408d) Validation of Agglomeration Modeling Methodology and Proposed Mechanism of Ash Agglomerate Growth in Fluidized Bed Combustors .....</b>	<b>560</b>
<i>Aditi Khadilkar, Sarma Pisupati, Peter Rozelle</i>	
<b>(408e) Numerical Simulation of the Effects of Size Change in a Coal Gasifier Using Method of Moments Approach .....</b>	<b>571</b>
<i>Emad Ghadirian, Hamid Arastooopour, Javad Abbasian</i>	
<b>(408f) Study of Structured Flow Pattern and Bubble Characteristics of a Pulsed Fluidized Bed Using Kinetic Theory and Turbulence Model .....</b>	<b>572</b>
<i>Zhizhong Ding, Mayank Tyagi, Krishnaswamy Nandakumar</i>	
<b>(408g) Powder Flow Characterization at Low Consolidation: 1. Modeling and Experimental Values of Torque Estimation .....</b>	<b>573</b>
<i>Hamid Salehi Kahrizsangi, Denis Schütz, Diego Barletta, Massimo Poletto</i>	
<b>(408h) CFD-DEM Simulation of Tube Erosion in a Bubbling Fluidized Bed with a Tube Bundle .....</b>	<b>574</b>
<i>Yongzhi Zhao, Lei Xu</i>	
<b>(409a) Advances in Autothermal Reformer Development .....</b>	<b>575</b>
<i>Steffen Schemme, Joachim Pasel, Andreas Tschauder, Remzi Can Samsun, Ralf Peters, Detlef Stolten</i>	
<b>(409b) Stable Start-up Process for 1 kWe Diesel Autothermal Reformer for Auxiliary Power Unit Applications .....</b>	<b>576</b>
<i>Jiwoo Oh, Minseok Bae, Dongyeon Kim, Joongmyeon Bae, Sai P. Katikaneni</i>	
<b>(409c) Production of Hydrogen Via Partial Dehydrogenation of Fuels .....</b>	<b>577</b>
<i>Mélanie Taillades, Jullien Belloc, Deborah Jones, Rozière Rozière</i>	
<b>(409d) Pure Hydrogen Production Via Methane Catalytic Decomposition on a Ni-Based Catalyst .....</b>	<b>578</b>
<i>Yongdan Li</i>	
<b>(409e) Production of Hydrogen from Various Feedstock Options Using Plasma Reforming .....</b>	<b>579</b>
<i>Lyman Frost, Joseph Hartvigsen, Elango Elangovan, Jessica Elwell</i>	
<b>(409f) Computational Fluid Dynamic Modeling of a Microplasma Fuel Reformer .....</b>	<b>580</b>
<i>Thaïeny Zucolotto, R. S. Besser, Peter J. Lindner</i>	
<b>(409g) Syngas Production Using Steam/Red Mud Gasification of Coal .....</b>	<b>581</b>
<i>Oleksandr Hietsoi, Foster A. Agblevor</i>	
<b>(409h) Hydrogen Production from Lignocellulosic Biomass Residues Via Gasification in Supercritical Water Catalyst Activity and Process Optimization Study .....</b>	<b>582</b>
<i>Ajay K. Dalai</i>	
<b>(415a) Featured: Organic Aqueous Flow Batteries for Massive Electrical Energy Storage .....</b>	<b>583</b>
<i>Michael J. Aziz</i>	
<b>(415b) Featured: Hydrogen-Based Redox FLOW Batteries .....</b>	<b>584</b>
<i>Mike Tucker, Adam Weber</i>	
<b>(415c) Achievable Alcohol Concentrations and Membrane Requirements for Artificial Photosynthetic System .....</b>	<b>585</b>
<i>Meenesh Singh, Alexis T. Bell</i>	
<b>(415h) Integrated Solar Energy Conversion and Storage Using Solar Flow Batteries .....</b>	<b>586</b>
<i>James R. McKone, Héctor D. Abruña, Francis J. DiSalvo</i>	
<b>(415e) Dynamic Energy Supply By a Pilot Scale Liquid Organic Hydrogen Carrier Unit .....</b>	<b>587</b>
<i>André Fikrt, Karsten Müller, Wolfgang Artl</i>	
<b>(415f) Fabrication of CoTiO<sub>3</sub>/g-C<sub>3</sub>N<sub>4</sub> Hybrid Photocatalysts with Enhanced H<sub>2</sub> Evolution .....</b>	<b>588</b>
<i>Xia Tao, Yan-Zhen Zheng</i>	
<b>(415g) Combining Thermochemical with Sensible Heat Storage for Increasing the Stored Energy Density and Providing Stable Heat Transfer Fluid Outflow Temperature .....</b>	<b>589</b>
<i>Stefan Stroehle, Andreas Haselbacher, Zoran R. Jovanovic, Aldo Steinfeld</i>	

<b>(420f) Next-Generation High-Efficiency Hybrid Solar to Hydrogen Conversion with Integrated Storage</b> .....	590
<i>Christos N. Markides</i>	
<b>(420g) Understanding and Eliminating Interaction of Cells in an Electrochemical Stack</b> .....	591
<i>Ashwini Kumar Sharma, Erik Birgersson</i>	
<b>(420a) Advancement of Hydrogen Storage Technologies</b> .....	592
<i>Patrick Adametz, Karsten Müller</i>	
<b>(420c) Thermodynamic and Economic Evaluation of Hydrogen Transport Technologies</b> .....	593
<i>Patrick Adametz, Karsten Müller, Wolfgang Arlt</i>	
<b>(420d) State-of-the-Art of the Liquid Organic Hydrogen Carrier (LOHC) Technology</b> .....	594
<i>Wolfgang Arlt, Daniel Teichmann, Peter Wasserscheid</i>	
<b>(420e) On Using CO<sub>2</sub> and Renewable Energy for Autonomous Cities</b> .....	595
<i>Raluca Suciu, Luc Girardin, Samuel Hanzhoz, Daniel Favrat, François Maréchal</i>	
<b>(421a) Invited - Preventing Nanoparticle Plate-out in Heat Exchangers during Carrier Fluid Phase Change and Implications for Power Generation</b> .....	596
<i>Jeromy Jenks, Satish K Nune, B. Peter McGrail, Nathan Phillips</i>	
<b>(421b) Invited - Particle ALD Cost/Performance Advantages</b> .....	597
<i>Karen J. Buechler</i>	
<b>(421c) Invited - Thermal and Plasma Enhanced Atomic Layer Deposition on Powders and Particles</b> .....	598
<i>Geert Rampelberg, Veronique Cremers, Delphine Longrie, Davy Deduytsche, Christophe Detavernier</i>	
<b>(421d) Employing Synergetic Effect of Doping and Thin Film Coating to Boost the Performance of Lithium-Ion Battery Cathode Particles</b> .....	599
<i>Rajankumar Patel, Xinhua Liang</i>	
<b>(421e) Particle Atomic Layer Deposition for Synthesis of Fuel Cell Catalytic Material</b> .....	600
<i>William McNeary, Alia M. Lubers, Megan Maguire, Daryl Ludlow, Austin Drake, Matthias Faust, Martin Seipenbusch, Alan W. Weimer</i>	
<b>(421f) Nanostructured Powders Made from Flame Spray Pyrolysis for Li-Ion Cathode</b> .....	601
<i>Jatinkumar Rana, Taylor Smith, Jinyun Liao, Khaleel Hamad, Yangchuan Xing</i>	
<b>(421g) Dry Coating of Electrode Particle with Model Particle of Sulfide Solid Electrolytes for All-Solid-State Secondary Battery</b> .....	602
<i>Hideya Nakamura, Takashi Kawaguchi, Satoru Watano</i>	
<b>(421h) Mixed-Oxide Based Redox Catalysts for Hydrocarbon Oxidation, Water-Splitting, and CO<sub>2</sub> Utilization</b> .....	603
<i>Fanxing Li</i>	
<b>(432a) Catalytic Co-Pyrolysis of Microalgae and Low Density Polyethylene Waste to Aromatic Hydrocarbons Using Activated Carbon</b> .....	604
<i>Emmanuel Ansah, Lijun Wang</i>	
<b>(432b) Modeling the Impact of Biomass Particle Residence Time on Fast Pyrolysis Yield and Composition</b> .....	612
<i>Gavin Wiggins, C. Stuart Daw, Emilio Ramirez</i>	
<b>(432c) Ring-Locking Enables Selective Anhydrosugar Synthesis from Carbohydrate Pyrolysis</b> .....	613
<i>Li Chen, Jin-mo Zhao, Sivaram Pradhan, Bruce E. Brinson, Gustavo E. Scuseria, Z. Conrad Zhang, Michael S. Wong</i>	
<b>(432d) Pyrolysis Kinetics To and From Levoglucosan</b> .....	614
<i>Vikram Seshadri, Phillip R. Westmoreland</i>	
<b>(432e) Molecular-Level Simulation of Thermogravimetric Analysis (TGA): A Cellulose Pyrolysis Example</b> .....	615
<i>Juan Lucio-Vega, Scott R. Horton, Michael T. Klein</i>	
<b>(432f) Impact of Carrier Gas and Temperature on Biomass Fast Pyrolysis Using a New Microsphere Microreactor Approach</b> .....	616
<i>Joseph J. Biernacki, Ali Zolghadr</i>	
<b>(432g) Study of Transmethylation As Primary Step on the Decomposition of Methoxy-Rich Lignin Model Compound over Zeolite Catalyst</b> .....	617
<i>Zhang Jiajun, Fidalgo Beatriz, Shen Dekui</i>	
<b>(439a) Optimal, Flexible and Feasible Heat Exchanger Network Design Under Severe Uncertain Industrial Operation Conditions</b> .....	618
<i>Kailiang Zheng, Huilong Gai, Helen H. Lou</i>	
<b>(439b) From Fossils to Bio-Based Economy: A Revolutionary Transformation in Process Industries</b> .....	619
<i>Kok Siew Ng, Jhuma Sadhukhan</i>	
<b>(439d) Optimal Co-Production of Market-Based Power Grid Support and Renewable Fuels or Chemicals</b> .....	620
<i>Robert Weiss, Lotta Kannari, Jari Pennanen, Teemu Sihvonen, Jouni Savolainen</i>	

<b>(439f) Improved Thermal Efficiency Analysis of Biomass Cookstoves</b> .....	628
<i>Cameron M. Quist, Matthew R. Jones, Randy S. Lewis</i>	
<b>(440a) Pilot-Scale Catalytic Biomass Pyrolysis Studies</b> .....	629
<i>Ofei D. Mante, David Dayton, David Barbee, James Shumaker, Kaige Wang</i>	
<b>(440b) Catalytic Pyrolysis of Bio-Oil Model Compounds over La/Ce/Ni Modified HZSM-5 Zeolites</b> .....	630
<i>Fengwen Yu</i>	
<b>(440e) Process Modeling of Fluidized Bed Biomass-CO<sub>2</sub> Gasification Using Aspen Plus</b> .....	637
<i>Narendra Sadhwani, Sushil Adhikari, Mario Richard Eden</i>	
<b>(440f) Simulation, Heat Integration and Rectisol-Based Decarbonisation for the Production of Synthetic Natural Gas from Biomass Gasification and Landfill Gases</b> .....	638
<i>Nasir Al Lagtah, Sagheer Onaizi</i>	
<b>(440g) Production of Synthetic Gas through Agricultural Waste Using Fixed BED Gasifier</b> .....	639
<i>Shaheen Aziz</i>	
<b>(443a) The Steam Iron Process for Pressurized Hydrogen Production</b> .....	640
<i>Gernot Voitic, Viktor Hacker, Stephan Nestl</i>	
<b>(443b) Integrated Thermochemical Water-Splitting Reactor Fuel Cell System for Electricity Generation</b> .....	641
<i>Vinod S. Amar, Jan Puszynski, Rajesh V. Shende</i>	
<b>(443c) The Development of Microchannel Reactors for Hydrogen Production: Experimentation and CFD Modelling</b> .....	642
<i>Raymond Everson, Hein Neomagus, Steven Chiuta, Dmitri Bessarabov</i>	
<b>(443d) Thermodynamic Modeling of the Hybrid Sulfur (HyS) Cycle for Hydrogen Production</b> .....	643
<i>Harnoor Kaur, Meng Wang, Maxmilian Gorenssek, Chau-Chyun Chen</i>	
<b>(443e) Utility Perspectives on the Hydrogen Economy</b> .....	644
<i>Noah D. Meeks</i>	
<b>(443f) Convective Heat Supply Reactor Concepts for the High Temperature Pyrolysis of Methane</b> .....	645
<i>Alejandro A. Munera Parra, David W. Agar</i>	
<b>(444a) Production of Levulinic Acid in Integrated Biorefineries from Municipal Solid Waste</b> .....	648
<i>Elias Martinez-Hernandez, Jhuma Sadhukhan, Kok Stew Ng</i>	
<b>(444b) Synthesis of Processing Paths For the Valorization of Specialty Chemicals in Microalgae Biorefineries</b> .....	649
<i>Melina Psycha, Antonis C. Kokossis</i>	
<b>(444c) Solvolytic Conversion of Biorefinery Lignin to Value-Added Products</b> .....	650
<i>Kwang Ho Kim, Seema Singh, Blake A. Simmons</i>	

## VOLUME 2

<b>(444d) Depolymerization of Kraft Lignin to Value-Added Chemicals over a MoCl<sub>5</sub>-X /Cu-MgAlO<sub>x</sub> Catalyst</b> .....	651
<i>Fei Yan, Yongdan Li</i>	
<b>(444e) Glycerol Oligomers Synthesized from Etherification of Glycerol with Zeolite-Supported Catalysts</b> .....	652
<i>Bing-Hung Chen, Chin-Kai Chen</i>	
<b>(444f) Influence of Pyrolysis Temperature on Characteristics and Aromatics Adsorption Capability of Magnetic Biochars Derived from Rice Straw Pyrolysis Oil Distillation Residue</b> .....	653
<i>Hao Li, Shuqian Xia, Peisheng Ma</i>	
<b>(455a) Process to Planet Framework for Sustainable Design: Systematic Approach for Developing a Multiscale Model and for Multiobjective Optimization</b> .....	654
<i>Tapajyoti Ghosh, Bhavik R. Bakshi</i>	
<b>(455b) Application of a Shale Environmental Footprint Optimization Tool to Enhance Operational Excellence— a Case Study of Selecting Process Fuels with Lower Cost and Less Potential for Impacts to Power Chevron Operations</b> .....	657
<i>Hong Jin, Janet Peargin, Abby Kirchofer, Oliver Schuller</i>	
<b>(455c) GHG Life Cycle Assessment for the United Arab Emirates Electricity Sector Combining Optimization and Simulation Tools</b> .....	658
<i>Alberto Betancourt-Torcat, Mohammed Alkatheri, Ali Almansoori</i>	
<b>(455d) Data Envelopment Analysis Coupled with Thermodynamic and Life Cycle Assessment Metrics for Solvent Screening: Application to CO<sub>2</sub> Capture</b> .....	665
<i>Phantisa Limleamthong, Gonzalo Guillén-Gosálbez, María González Miquel, Stavros Papadokonstantakis</i>	
<b>(455e) Using Multiobjective Optimization and Life Cycle Assessment for the Design of More Sustainable National and International Energy Systems</b> .....	666
<i>Nagore Sabio, Kathrin Volkart, Martin Densing, Neil Strachan</i>	

<b>(455f) Life Cycle Assessment and Multiobjective Optimization in a Natural Gas Based Petrochemical Complex</b> .....	669
<i>Fabio Antonio González Castaño, Jose Alberto Bandoni, Maria Soledad Diaz</i>	
<b>(457b) Comparison Between the OLI-MSE and eNRTL Models in Predicting Thermodynamic Properties of the NaNO<sub>3</sub>-HNO<sub>3</sub>-H<sub>2</sub>O Ternary System</b> .....	670
<i>Meng Wang, Maximilian B. Gorenssek, Chau-Chyun Chen</i>	
<b>(457c) Multi-Agent Optimization Framework (MAOP) for Synthesizing Optimal Radioactive Waste Blends</b> .....	671
<i>Berhane Gebreslassie, Urmila M. Diwekar</i>	
<b>(457d) Thermodynamics Analysis and Optimization of a Stirling Cycle for Lunar Surface Nuclear Power System</b> .....	672
<i>Senqing Fan, Minghai Li</i>	
<b>(457e) Simulation of Helium Transport Near Prismatic Dislocation Loops in Tungsten</b> .....	673
<i>Francesco Ferroni, Karl D. Hammond, Brian D. Wirth</i>	
<b>(457f) Atomistic and Continuum Drift-Diffusion Simulations of Helium Transport in Tungsten</b> .....	674
<i>Karl D. Hammond, Ian V. Naeger, Lin Hu, Sophie Blondel, Brian D. Wirth, Dimitrios Maroudas, David E. Bernholdt</i>	
<b>(459a) Engineering Escherichia Coli Strains for Optimal Performance in Co-Culture with Trichoderma Reesei for Consolidated Bioprocessing</b> .....	675
<i>Tatyana Saleski, Adam Krieger, Li Yuan, Xiaoxia (Nina) Lin</i>	
<b>(459b) PHA Production Using Yarrowia Lipolytica and Alternative Feedstocks</b> .....	676
<i>Michael Spagnuolo, Difeng Gao, Mark A. Blenner</i>	
<b>(459c) Rewiring Native Metabolism of Yarrowia Lipolytica for Enhanced Assimilation of Complex Biomass-Derived Sugars and High-Yield Production of Organic Acids</b> .....	677
<i>Seunghyun Ryu, Cong T. Trinh, Caleb Walker, Andrew Kirkpatrick</i>	
<b>(459d) Using Protein Design to Evaluate the Relationship Between Protein Surface Potential and Protein-Lignin Binding for the Eventual of Low Lignin Binding Cellulases</b> .....	678
<i>Carolyn Haarmeyer, Matthew Smith, Shishir PS Chundawat, Deanne W. Sammond, Tim Whitehead</i>	
<b>(459e) Towards Development of Rhodococcus Opacus As a Microbial Cell Factory: Conversion of Lignin-Derived Aromatic Compounds into Lipids</b> .....	679
<i>William R. Henson, Drew DeLorenzo, Soo Ji Kim, Tae Seok Moon</i>	
<b>(459f) Defining the Minimal Set of Microbial Genes Required for Valorization of Lignin Biomass</b> .....	680
<i>Nikita Khlystov, Elizabeth Sattely</i>	
<b>(459g) Invited Presentation: Lignin Conversion By Biological Funneling and Chemical Catalysis</b> .....	681
<i>Gregg T. Beckham</i>	
<b>(460a) Next-Generation Testing Platform for Strain Optimization, Screening, and Fermentation Testing</b> .....	682
<i>Michael D. Leavell</i>	
<b>(460b) Harnessing Biological Complexity and Diversity through Metabolic Engineering: The Manus Bio Approach</b> .....	683
<i>Christine Santos</i>	
<b>(460c) The Emerging Organism Engineering Industry</b> .....	684
<i>Reshma Shetty</i>	
<b>(460d) General Purposing Synthetic Biology: A Biofoundry in a Box</b> .....	685
<i>Eileen Spindler</i>	
<b>(460h) Making Silk without Silkworms: Using Industrial Biotechnology to Make Performance Protein-Based Fibers</b> .....	686
<i>David N. Breslauer</i>	
<b>(460f) The Development of Platform-Based Technologies for the Optimization of Sustainably Produced Chemicals</b> .....	687
<i>Stephanie J. Culler</i>	
<b>(460i) Imagine, Design, Create – Cloud Based Software for Biological Design</b> .....	688
<i>Eli Groban</i>	
<b>(462a) Applications of Omics Technologies for Enhanced Process Robustness in a Chemically Defined Fed-Batch Industrially Relevant CHO Cell Culture Process</b> .....	689
<i>Kyle McElearney, Alan Gilbert, Smitha Krishnan, Nicholas Alden, Kyongbum Lee, Rashmi Kshirsagar</i>	
<b>(228al) Scale Related Variables and Their Potential Impact on Process and Product Quality in the Production of Biologics</b> .....	690
<i>Prince Bhebe</i>	
<b>(462c) Design and Simulation of a Continuous Rotating Annular Bioreactor with an Internal Spiroid</b> .....	691
<i>Shu Fang, Eugene Boland, Paul W. Todd, Thomas R. Hanley</i>	



<b>(462d) Cell Culture of the Termite Gut Microbiome Using a 3D-Printed Synthetic Microhabitat .....</b>	<b>692</b>
<i>Cameron A. Harrington, Andrea L. Kadlak, Alyssa M. Pierne, Elise B. Gilcher, Mitchell S. Cyr, Charles M. Bridges, Michael E. Stephens, Daniel J. Gage, Leslie M. Shor</i>	
<b>(228ak) Single High-EDR Exposure of Cultured Human Cells Reveal Effects of Prolonged Doublings and Microcarrier Attachment on Cell Shear Susceptibility.....</b>	<b>693</b>
<i>Eric Plencner, Peter Amaya, Peter Rapiejko, Jeffrey J. Chalmers</i>	
<b>(462f) Metabolite Pathway Analysis for Analyzing Consumption of Amino Acids in Hybridoma Cell in Different Types of Growth Media and Cell Culture Process Conditions.....</b>	<b>695</b>
<i>Seo-Young Park</i>	
<b>(462g) Confessions of a Cell Culture Engineer: Process Impact on Protein Products in a QbD World.....</b>	<b>696</b>
<i>Robert Kiss</i>	
<b>(471a) Systematic Process Design Strategies for Efficient and Synergistic Integration of Solar Thermal Hydrogen, Electricity and Fresh Water Production Processes .....</b>	<b>697</b>
<i>Emre Gençer, Mohit Tawarmalani, Rakesh Agrawal</i>	
<b>(471b) Ideas As a Process Intensification Tool with Application to Natural Gas Reforming Based Hydrogen Production.....</b>	<b>698</b>
<i>Patricia Pichardo, Vasilios Manousiouthakis</i>	
<b>(471c) Optimal Design of Integrated Upgrading Plant and Utility System for the Oil Sands Industry .....</b>	<b>699</b>
<i>Hossein Shahandeh, Zukui Li</i>	
<b>(471d) Design and Operation of a 10 MWe Supercritical CO2 Recompression Brayton Power Cycle.....</b>	<b>700</b>
<i>Stephen E. Zitney, Eric A. Liese</i>	
<b>(471e) Integrated Thermochemical Process for Optimal Co-Production of Liquid Fuels and Chemicals .....</b>	<b>701</b>
<i>Zhihong Yuan, Mario Richard Eden</i>	
<b>(471f) Design and Optimization of Integrated Carbon Capture and Conversion with Natural Gas to Produce Syngas.....</b>	<b>702</b>
<i>Shachit S. Iyer, Priyadarshini Balasubramanian, Ishan Bajaj, M. M. Faruque Hasan</i>	
<b>(471g) Optimal Design and Operation of a Semi-Closed Oxy-Combustion Combined Cycle Power Plant.....</b>	<b>703</b>
<i>Holger Teichgraber, Adam Brandt</i>	
<b>(471h) Natural Gas to Liquids, Olefins, and Aromatics Under Uncertainty in Feedstock and Product Prices.....</b>	<b>704</b>
<i>Alexander M. Niziolek, Onur Onel, Logan R. Matthews, Yannis A. Guzman, Christodoulos A. Floudas</i>	
<b>(472a) Examining the Partitioning Coefficients of Butanol and Other Fermentation Metabolites Produced By Clostridium Pasteurianum into a Lipid Vesicle Solvent.....</b>	<b>705</b>
<i>John Nunes, Geoffrey Bothun, Carmen Scholz</i>	
<b>(472b) Intensified Liquid-Liquid Extraction with Chemical Reaction By Emulsification.....</b>	<b>706</b>
<i>Andreas Toth, Robert Macher-Ambrosch, Daniela Painer, Susanne Lux, Matthäus Siebenhofer</i>	
<b>(472c) Hybrid Shortcut-Modell for Estimating Partition Coefficients in Aqueous Two-Phase Extraction of Therapeutic Proteins.....</b>	<b>707</b>
<i>Christoph Brandenbusch, Gabriele Sadowski</i>	
<b>(472d) Novel Purification Process for Bio-Derived Citric Acid Using Solvent Extraction and CO2 Antisolvent Purification .....</b>	<b>708</b>
<i>Alvaro Orjuela, Camila Martínez, Melisa Martínez, Alexis Tigreros</i>	
<b>(473a) State of the Art Chemical Reaction Model of Hydrogen Sulfide Scavenger in Produced Gas Flow-Line Using Computational Fluid Dynamics.....</b>	<b>709</b>
<i>Emanuel Marsis, Tudor C. Ionescu, Paul Stead, Muhammad Sami, Sunder Ramachandran, Scott Lehrer</i>	
<b>(473b) Computational Study of the Bubbling-to-Slugging Transition in a Laboratory-Scale Fluidized Bed .....</b>	<b>719</b>
<i>Emilio Ramirez, Charles E. A. Finney, C. Stuart Daw, Sreekanth Pannala, Jack Halow, Qingang Xiong</i>	
<b>(473c) Particle and Gas Velocities in a Vortex Driven Externally Recirculated Fluidized Bed .....</b>	<b>731</b>
<i>Ronald W. Breault, Michael Bobek</i>	
<b>(473d) CFD DEM Coupling Validation for Pneumatic Separation of Sugarcane Bagasse.....</b>	<b>732</b>
<i>Eduardo Almeida, Nicolas Spogis, Maria Aparecida Silva</i>	
<b>(473e) CFD-DEM Simulation of Hydrodynamics in Wet Gas-Solid Fluidized Beds.....</b>	<b>742</b>
<i>Christopher M. Boyce, Ali Ozel, Jari Kolehmainen, Sankaran Sundaresan</i>	
<b>(473f) Circulation and Separation of Binary Solids in Connected Fluidized Beds.....</b>	<b>743</b>
<i>Yusumi Nagahashi, Hideki Takeuchi, John R. Grace, Tomohiro Kawamura, Yutaka Asako</i>	
<b>(473g) Numerical Study on the Hydrodynamics Behaviour in Bubbling Fluidized Bed for Sewage Sludge Gasification .....</b>	<b>751</b>
<i>Wenbo Zhan, Chi-Hwa Wang</i>	

<b>(448w) Realization, Control and Stability Analysis of Multiple Temperature Zones in Liquid-Containing Gas-Solid Fluidized Bed Reactor</b> .....	752
<i>Yefeng Zhou, Qiang Shi, Zhengliang Huang, Xiayi Hu, Jingdai Wang, Yongrong Yang</i>	
<b>(491a) Graphene Nanoribbons As Conductive Pathways in Directly Deposited Silicon Nanofiber Anodes for High Performance Lithium-Ion Batteries</b> .....	753
<i>Ghazal Shoorideh, Zhong Li, Srinivasan Chakrapani, Bharat Patel, Yong L. Joo, Adam Berry, Byunghee Ko</i>	
<b>(491b) Si-Based Nanofiber Anodes for Li-Ion Batteries Prepared Using Particle/Polymer Electrospinning</b> .....	754
<i>Ethan C. Self, Emily C. McRen, Ryszard Wycisk, Jagjit Nanda, Gao Liu, Peter N. Pintauro</i>	
<b>(491c) In Situ Activation of Nitrogen-Doped Graphene-Based Materials Anchored on Graphite Foam for High-Performance Energy Storage</b> .....	755
<i>Junyi Ji, Xingbin Lv, Yanfang Zhu, Hairong Yue, Wei Jiang, Changjun Liu, Lili Zhang</i>	
<b>(491d) Solution Combustion Synthesis for High Performance ZnCo<sub>2</sub>O<sub>4</sub> Anode in Lithium-Ion Batteries</b> .....	756
<i>Ryan A. Adams, Vilas G. Pol, Arvind Varma</i>	
<b>(491e) A General and Mild Approach to Controllable Preparation of Manganese-Based Micro/Nanostructured Bars for High Performance Lithium-Ion Batteries</b> .....	757
<i>Weixin Zhang, Zeheng Yang</i>	
<b>(491f) Advanced Energy Materials Derived from Bijels</b> .....	758
<i>Jessica A. Witt, Daniel R. Mumm, Ali Mohraz</i>	
<b>(491g) Sulfur Self-Doped Micro/Mesoporous Carbon Derived from Lignin and Its Application on Supercapacitor and Oxygen Reduction Reaction</b> .....	759
<i>Muslum Demir, Ram B. Gupta</i>	
<b>(492a) The U.S. Department of Energy's R&amp;D Program for Carbon Use and Reuse</b> .....	760
<i>Lynn Brickett, Rameshwar Srivastava</i>	
<b>(492c) Economic Production of Syngas from CO<sub>2</sub> and H<sub>2</sub>O: New Routes to Synthetic Fuels</b> .....	761
<i>Zengcai Liu, Robert Kutz, Hongzhou Yang, Richard I. Masel, Syed Dawar Sajjad</i>	
<b>(492d) Electrochemical Carbon Dioxide Reduction As an Alternative Source of Fuels and Chemicals</b> .....	762
<i>Etosha Cave, Kendra Kuhl, George Leonard, Daniel Diaz, Nicholas Flanders</i>	
<b>(492e) Enhanced Asphaltene Precipitation in Paraffinic Froth Treatment Using Carbon Dioxide</b> .....	763
<i>Yuming Xu, Surjit Thind</i>	
<b>(492f) CO<sub>2</sub> Conversion to Novel Solid Materials</b> .....	764
<i>Yun Hang Hu</i>	
<b>(496a) Characterization of TFA Regenerated Cellulose with a Two-Step Treatment to Understand the Impact of Cellulose Structure on Hydrolysis</b> .....	765
<i>Ximing Zhang</i>	
<b>(496b) The Role of Atmosphere, Solvents and Acids on the Production of 5-Hydroxymethylfurfural from Biomass Derived Fructose</b> .....	766
<i>Glen Svenningsen, Phillip Christopher, Rajeev Kumar, Charles Wyman</i>	
<b>(496c) Lignin Depolymerization into Aromatic Monomers over Acidic Mesoporous Silicates</b> .....	767
<i>Kakasaheb Nandiwale, Andrew Danby, Anand Ramanathan, Raghunath V. Chaudhari, Bala Subramaniam</i>	
<b>(496d) Characteristics and Activity of Steamed Zeolites for Butanol Upgrading to Higher Olefins</b> .....	768
<i>Mond Guo, Michel Gray, Vijayakumar Murugesan, Karthikeyan K. Ramasamy</i>	
<b>(496e) Tandem Catalysis in a New, Solid-Phase Route to Renewable Aromatic Chemicals from Biobased Furanics</b> .....	769
<i>Homer Genuino, Shanmugam Thiagarajan, Jan van der Waal, Ed de Jong, Jacco van Haveren, Dan van Es, Bert Weckhuysen, Pieter Bruijninx</i>	
<b>(496g) Reaction Pathways and Microkinetic Modeling of Levulinic Acid Hydrodeoxygenation Over Sulfided NiMo/Al<sub>2</sub>O<sub>3</sub></b> .....	770
<i>Miha Grilc, Blaž Likozar</i>	
<b>(498a) The Sunshot Initiative: New Opportunities for R&amp;D in Concentrating Solar Power</b> .....	775
<i>Abraham M. Shultz</i>	
<b>(498b) Non-Stoichiometric Perovskite Oxides As High-Temperature Energy Storage Media and Their Application to Concentrating Solar Power Generation and Hydrogen Production</b> .....	776
<i>Sean Babiniec, Eric N. Coker, Andrea Ambrosini, Ellen Stechel, Peter Loutzenhiser, James Miller</i>	
<b>(498c) Solar Thermochemical Energy Storage Based on Strontium Carbonate Chemistry</b> .....	777
<i>Nick AuYeung, Elham Bagherisereshki, Laureen Meroueh, Karthik Yenduru, Arindam Dasgupta, Duo Jiang</i>	
<b>(498d) Kinetics of Manganese-Based Mixed Metal Oxide Redox Cycling for Solar Thermochemical Energy Storage</b> .....	778
<i>Marziyeh Hamidi, Peter Kreider, Barbara J. Ward, Roman Bader, Brian D. Ehrhart, Alan W. Weimer, Wojciech Lipinski</i>	

<b>(498e) Grid-Scale Thermochemical Energy Storage Using Mixed Metal Oxide Redox Cycles</b> .....	779
<i>Peter Kreider, Roman Bader, Marziyeh Hamidi, Barbara J. Ward, Brian D. Ehrhart, Alan W. Weimer, Wojciech Lipinski, Keith Lovegrove, John Pye, Joe Coventry, Lifeng Li, Qi Lei</i>	
<b>(498f) Kinetic Analysis of High Temperature Thermochemical Energy Storage Based on Calcination–Carbonation Chemical Looping Reactions</b> .....	780
<i>Larissa Fedunik-Hofman, Alicia Bayon, Jim Hinkley, Wojciech Lipinski, Scott W. Donne</i>	
<b>(498g) Thermodynamic Analysis of CaCO<sub>3</sub>/CaO Looping for High Temperature Thermochemical Energy Storage</b> .....	781
<i>Qinyi Ye, Alicia Bayon, Lindsey Yue, Larissa Fedunik-Hofman, Roman Bader, Jim Hinkley, Wojciech Lipinski</i>	
<b>(503a) Study of Bio-Inspired Nanostructured Materials for Solar Energy Conversion</b> .....	782
<i>Md Moniruddin, Nurxat Nuraje, Joseph Johnson</i>	
<b>(503b) Direct Glycerol Fuel Cell with Polytetrafluoroethylene (PTFE) Thin Film Separator</b> .....	783
<i>Neeva Benipal, Ji Qi, Jacob C. Gentile, Wenzhen Li</i>	
<b>(503c) Catalytic Behavior in Internal Steam Reforming of Methane in SOFC Conditions over LaX<sub>2</sub>Sr<sub>2</sub>-XMnO<sub>4</sub> Materials</b> .....	784
<i>Juan Sebastián Vecino-Mantilla, Maria Paola Gauthier-Maradei, Gilles Henri Gauthier, Karen Silva, Patrick Gèlin, Monica Viviana Sandoval-Rincón</i>	
<b>(503d) Direct Fast Pyrolysis Bio-Oil Fuel Cell</b> .....	785
<i>Neeva Benipal, Ji Qi, Patrick Johnston, Jacob C. Gentile, Robert C. Brown, Wenzhen Li</i>	
<b>(503e) Nature-Inspired Fractal Flow Field for PEM Fuel Cells</b> .....	786
<i>Tobias P. Neville, Jason Cho, Panagiotis Trogadas, Marc-Olivier Coppens, Dan Brett, Jeffrey Marquis</i>	
<b>(503f) Membraneless Fuel Cells Modified with Gold Nanoparticles and Laccase for Direct Conversion of Recalcitrant Carbohydrates into Electricity</b> .....	789
<i>Yang Kun-Lin, Nianjia Seow</i>	
<b>(503g) Role of Hydrogen in Future Clean Energy Landscape</b> .....	790
<i>Sanjiv Ratan</i>	
<b>(504a) Population Ensemble Modeling of Cellulose Dissolution: Insights for Efficient Biomass Processing</b> .....	791
<i>Mohammad Ghasemi, Marina Tsianou, Paschalis Alexandridis</i>	
<b>(504b) Renewable Aromatic Hydrocarbon Production from Furfural By a Continuous Dual-Stage Hydrogenation-Cocacking Process</b> .....	792
<i>Qinjie Cai</i>	
<b>Biomass Anaerobic Conversion Technology Development</b> .....	793
<i>Xiaoying Kong</i>	
<b>(504c) Oxidative Desulfurization of DBT with H<sub>2</sub>O<sub>2</sub> Catalysed By TiO<sub>2</sub>/Porous Glass</b> .....	794
<i>Yujun Wang, Guangsheng Luo</i>	
<b>(504d) Hydrolysis of Corncob Using a Modified Carbon-based Solid Acid Catalyst</b> .....	795
<i>Wei Qi, Yu Zhang</i>	
<b>(504e) Simultaneous Catalytic Conversion of Bio-Oil and Bio-Char for Hydrogen Production</b> .....	796
<i>Su-ping Zhang</i>	
<b>(504f) The Pretreatment of Pennisetum Hybrid with Composite Solid Base Catalyst</b> .....	797
<i>Xinshu Zhuang</i>	
<b>(515a) Realization of Sustainable and Cost-Effective Cellulosic Ethanol Production By Deploying Enzyme and Advanced Yeast Technologies in an Integrated Approach</b> .....	798
<i>Panagiotis Sarantinopoulos, Paul de Waal, Hans de Bruijn, Paul Klaassen, Mickel Jansen, Herman Pel</i>	
<b>(515b) Alternative Transport Fuels and Their Production Using Surplus Renewable Electricity, Water and CO<sub>2</sub></b> .....	799
<i>Steffen Schemme, Remzi Can Samsun, Thomas Grube, Ralf Peters, Detlef Stolten</i>	
<b>(515c) Co-Products from the Catalytic Fast Pyrolysis of Biomass</b> .....	800
<i>Mark Nimlos, Nolan Wilson, Calvin Mukarakate</i>	
<b>(515f) Application of Molecular Characterization to Bituminous Crude Oil to Study Asphaltene Precipitation</b> .....	801
<i>M. R. Islam, Yifan Hao, Meng Wang, Toni Kirkes, Chau-Chyun Chen</i>	
<b>(515e) Rapid Analysis of Syngas Using Micro GC Fusion</b> .....	802
<i>Shawn Wilson</i>	
<b>(516a) Discovery and Manipulation of a Native Polyketides Influencing ABE Production in Clostridium Acetobutylicum</b> .....	803
<i>Nicolaus Herman, Ripika Bedi, Seong Jong Kim, Jeffrey Li, Wenjun Zhang</i>	
<b>(516b) Machine Learning-Driven Pathway Optimization: Application of Automation in Industrial Biotechnology</b> .....	804
<i>Mohammad Hamedirad, Ran Chao, Saurabh Sinha, Huimin Zhao</i>	

<b>(516c) Engineering Methanogenesis Pathway of Methanogenic Archaea for Biofuel Production</b> .....	805
<i>Maryam Raeesazadeh-Sarmazdeh, Jacqueline Gonzalez, Wilfred Chen</i>	
<b>(516d) Production of Wax Esters As High-Value Compounds in Yeast <i>Yarrowia Lipolytica</i></b> .....	806
<i>Le Zhao, Fuyuan Jing, James Yu, Suzanne Sandmeyer, Jacqueline V. Shanks, Zengyi Shao</i>	
<b>(516e) A Microbial Factory for Sustainable Production of Polymer Precursors: Chain Length-Specified <math>\omega</math>-Hydroxy Fatty Acids and <math>\alpha,\omega</math>-Dicarboxylic Acids</b> .....	807
<i>Christopher Bowen, Fuzhong Zhang</i>	
<b>(516f) Model-Guided Metabolic Engineering of Increased 2-Phenylethanol Production in Plants</b> .....	808
<i>Shaunak Ray, Joseph Lynch, John A. Morgan, Clint Chapple, Natalia Dudareva</i>	
<b>(516g) The Emerging Organism Engineering Industry (Featured Presentation)</b> .....	809
<i>Reshma Shetty</i>	
<b>(524a) Smartwaste- Biomass Conversion into Low Oxygenated Hydrocarbons in Subcritical Water</b> .....	810
<i>Roy Posmanik, Danilo Cantero, Celia Martinez, Borja Cantero-Tubilla, Jefferson W. Tester</i>	
<b>(524b) Catalytic Hydrothermal Gasification of Post Hydrothermal Liquefaction Waste Water for Biogas Production</b> .....	812
<i>Peng Zhang, Lance Schideman, Young Hwan Shin, Wan-Ting Chen, Yuanhui Zhang</i>	
<b>(524c) Development of an Integrated Process for Sustainable Production of Biodiesel and Plant Protein Isolates from Underutilized Feedstock</b> .....	813
<i>Solmaz Tabatabaei, Levente L. Diosady</i>	
<b>(524d) Combustion of Pyrolysis Char with a Fluidized Bed Reactor for Generating Process Heat</b> .....	814
<i>Nicholas R. Schwartz, Paul E. Yelvington</i>	
<b>(524e) Small Scale Distributed Ammonia Produced: Analysis of Pilot Plant Runs and Routes to Improve the Economics of Scale</b> .....	822
<i>Mahdi Malmali, Mike Reese, Corry Marquart, Eric Buchanan, Kevin Wagner, Alon McCormick, Ed Cussler</i>	
<b>(524f) A Supply Chain Optimization Framework for Distributed Renewable Ammonia Production</b> .....	823
<i>Andrew Allman, Prodromos Daoutidis</i>	
<b>(524g) NH<sub>3</sub> – the Optimal Liquid Transportation Fuel</b> .....	824
<i>Norman K. Olson</i>	
<b>(527a) Implementing Robust Vapor-Liquid Equilibrium Calculations in Nonsmooth Multi-Stream Heat Exchanger Models</b> .....	832
<i>Mattias Vikse, Harry A. J. Watson, Truls Gundersen, Paul I. Barton</i>	
<b>(527b) Shared and Practical Approach to Conserve Utilities in Eco-Industrial Parks</b> .....	833
<i>Sajitha K. Nair, Yingjian Guo, Ushnik Mukherjee, Iftekar A. Karimi, Ali Elkamel</i>	
<b>(527c) Optimal Design and Operation of Integrated Multi-Vector Energy Networks</b> .....	836
<i>Sheila Samsatli, Nouri J. Samsatli</i>	
<b>(527d) Simultaneous Optimization of Design and Operation Strategies for CHP Systems</b> .....	837
<i>Abigail Ondeck, Michael Baldea, Thomas F. Edgar</i>	
<b>(527e) Exploiting Dynamic Flexibility to Enable Participation in Multi-Scale Electricity Markets</b> .....	838
<i>Alexander W. Dowling, Ranjeet Kumar, Victor M. Zavala</i>	
<b>(527f) A Rolling Horizon Scenario-Based Approach for Smart House Management Under Uncertainty</b> .....	839
<i>Javier Silvente, Georgios M. Kopanos, Vivek Dua, Lazaros G. Papageorgiou</i>	
<b>(527g) Optimization Models for Shale Gas Well Refracture Treatments</b> .....	840
<i>Markus G. Drouven, Diego C. Cafaro, Ignacio E. Grossmann</i>	
<b>(527h) A Composite-Curve-Based Biomass Procurement Planning Approach</b> .....	842
<i>Wenzhao (Tony) Wu, Daniel Kurniawan, Wenbo Zhu, Christos T. Maravelias</i>	
<b>(534a) Enhanced Ethanol Production Via Activated Carbon Addition During Syngas Fermentation</b> .....	845
<i>Hasan K. Atiyeh, John R. Phillips, Raymond Huhnke, Randy S. Lewis</i>	
<b>(534b) A Discussion of Realistic Feedstocks: Can We Use 2-Year-Old Short Rotation Hybrid Poplar Coppice for Fuels and Chemicals Production Via Biochemical and Thermochemical Conversion?</b> .....	846
<i>Chang Dou, Devin Chandler, Fernando Resende, Rick Gustafson, Renata Bura</i>	
<b>(534c) Pyrolytic and Electrochemical Upgrading of Lignins Extracted from Pretreated Biomass to Produce Liquid Fuel Intermediates and Value-Added Products</b> .....	847
<i>Mahlet Garedew, Angela Hoang, Leonardo da Costa Sousa, James E. Jackson, Christopher M. Saffron</i>	
<b>(534e) Combined Biochemical and Thermochemical Processing of Lignocellulosic Biomass: Techno-Economic Evaluation</b> .....	848
<i>Katelyn M McClung, François Marechal, Jeremy S. Luterbacher</i>	
<b>(534f) Total Site Analysis As a Synthesis Model to Select, Optimize and Integrate Processes in Biorefineries</b> .....	849
<i>Konstantinos A. Pyrgakis, Antonis C. Kokossis</i>	

<b>(536a) Multianalyte Electrochemical Sensors on a Monolith Electrode By Optically Probing the Electrical Double Layer .....</b>	<b>852</b>
<i>Santanu Roy, Abhijeet Prasad, Rahul Tevatia, Seung-Woo Lee, Ravi Saraf</i>	
<b>(536b) Role of Defects in Enhancing the Electrochemical Properties of Transition Metal Oxide.....</b>	<b>853</b>
<i>Vidhya Chakrapani</i>	
<b>(536c) The Degradation of Additives During the Electrodeposition of Copper for Metamaterial Fabrication .....</b>	<b>854</b>
<i>Shendu Yang, Zach Thacker, Evan Allison, Patrick J. Pinhero, Nicholas Cole</i>	
<b>(536d) Field Effect Control of Electrochemical Reaction Kinetics at Back-Gated, Ultrathin Semiconductor Electrodes.....</b>	<b>855</b>
<i>Chang-Hyun Kim, C. Daniel Frisbie</i>	
<b>(536e) Electrochemical Synthesis of Organic Nanorods on Gold Nanoparticles Seeds.....</b>	<b>856</b>
<i>Xuecheng Yu, Pedram Jahanian, Guangzhao Mao</i>	
<b>(536f) Interfacial Structure and Capacitance of Li-Doped Ionic Liquid Electrolytes from Molecular Simulations.....</b>	<b>857</b>
<i>Justin B. Haskins, John W. Lawson</i>	
<b>(536g) Reactivity of an Alucone Thin Film Coating on a Lithiated Si Anode of Li-Ion Batteries.....</b>	<b>858</b>
<i>Jose L. Gomez-Ballesteros, Perla B. Balbuena</i>	
<b>(536h) Microstructure of Room-Temperature Ionic Liquids at Charged Surfaces Revealed By Integrated Modeling and Experimental Approaches.....</b>	<b>859</b>
<i>Guang Feng, Jennifer Black, Nina Balke, Peter T. Cummings</i>	
<b>(536i) Mathematical Models for the Impedance Response of Subcutaneous Glucose Sensors.....</b>	<b>860</b>
<i>Morgan Harding, Mark E. Orazem</i>	
<b>(536j) The Effect of Alkali and Quaternary Ammonium Cations on the Electrochemical Interface Studied By in-Situ Infrared Spectroscopy .....</b>	<b>861</b>
<i>Marco Dunwell, Yushan Yan, Bingjun Xu</i>	
<b>(540a) CFD Modeling and Computation for an Industrial Steam Methane Reforming Furnace.....</b>	<b>862</b>
<i>Andres Aguirre, Anh Tran, Helen Durand, Marquis Crose, Panagiotis D. Christofides</i>	
<b>(540b) Toward Optimal NGL Conversion to Olefins: Advances in Steam Cracking Optimization .....</b>	<b>863</b>
<i>Onur Onel, Alexander M. Niziolek, Christodoulos A. Floudas</i>	
<b>(540c) Decarbonization of Electricity Grids: A Multi-Scale Challenge.....</b>	<b>864</b>
<i>Mahdi Sharifzadeh, Nilay Shah</i>	
<b>(540d) Efficient Global Optimization for a Mixed AC-DC Power Distribution System .....</b>	<b>865</b>
<i>Dan Li, Xiang Li</i>	
<b>(540e) Data-Driven Modeling of Gas Leakage from Shale Natural Gas Wells.....</b>	<b>866</b>
<i>Shobhit Misra, Michael Nikolaou</i>	
<b>(540f) The Simulation of an Industrial Wet Flue Gas Desulfurization Absorber.....</b>	<b>867</b>
<i>Raymond Everson, Arif Arif, David Branken, Hein Neomagus, Samrana Arif</i>	
<b>(540g) Modeling Chemotactic Bacterial Transport in Physically Homogeneous Groundwater Systems Containing Distributed Contaminant Sources .....</b>	<b>868</b>
<i>Joanna S. T. Adadevoh, Roseanne M. Ford</i>	
<b>(540h) Analytical Calculation of Laminar Flow Reactor Effluent Concentrations without the Necessity of a CFD Approach.....</b>	<b>869</b>
<i>Vasilios Manousiouthakis, Nicholas Margull</i>	
<b>(545a) New Bimetallic Catalysts for CO<sub>2</sub> Hydrogenation to Chemicals and Fuels for Sustainable Energy Development .....</b>	<b>870</b>
<i>Chunshan Song</i>	
<b>(545b) Combined Magnesium OXIDE/Water Gas Shift-Based CO<sub>2</sub> Capture Process .....</b>	<b>871</b>
<i>Andrew Lucero, Jiajia Meng, Shen Zhao, Santosh Gangwal</i>	
<b>(545c) Oxidative Dehydrogenation of Ethane and Propane By CO<sub>2</sub>.....</b>	<b>872</b>
<i>Jungshik Kang, Vadim Guliants</i>	
<b>(545d) Conversion of Coal and Biomass to Liquid Hydrocarbons Using Gasification and a Hybrid Fischer Tropsch Catalyst .....</b>	<b>873</b>
<i>Lyman Frost, Joseph Hartvigsen, Elango Elangovan, Jessica Elwell</i>	
<b>(545e) The Effects of Carbon Dioxide on the Adsorption Capacity of Methane in Shale.....</b>	<b>874</b>
<i>Bing Cao</i>	
<b>(553a) Flare Minimization for Simultaneous Turnaround Operations of Two Olefin Plants .....</b>	<b>875</b>
<i>Yiling Xu, Qiang Xu, Sujing Wang</i>	
<b>(553c) Consequence Assessment for Event Tree Analysis in Transitions Using Dynamic Simulation .....</b>	<b>876</b>
<i>Yan Fang, M.A.K. Rasel, Peyton C. Richmond</i>	
<b>(553e) Effect of Chemical Price Uncertainty on Project Viability: An Economic Evaluation.....</b>	<b>877</b>
<i>Gaurav Arora, Mohammad Shafiei, Mike Huckman</i>	

<b>(555a) Automated Reaction Mechanism Generation Including Nitrogen As a Heteroatom .....</b>	<b>878</b>
<i>Alon Grinberg Dana, Beat Buesser, Shamel S. Merchant, William H. Green</i>	
<b>(555b) Modeling the Combustion of Otto Fuel.....</b>	<b>879</b>
<i>C. Franklin Goldsmith, Eric Tierney, Richard H. West</i>	
<b>(555c) Molecular Weight Growth Kinetics of Olefin Pyrolysis Under Low to Intermediate Temperatures.....</b>	<b>880</b>
<i>Kun Wang, Anthony M. Dean, Stephanie Villano</i>	
<b>(555d) Detailed Kinetic Modeling of Gas Evolution and Energy Recovery during Chemical Quenching of Acetylene Production in Thermal Plasma .....</b>	<b>881</b>
<i>Yan Cheng, Tianyang Li, Yi Cheng</i>	
<b>(555e) Predictive Modeling of Thermal Decomposition of Hydrocarbon Mixtures .....</b>	<b>882</b>
<i>William H. Green, Kehang Han</i>	
<b>(555g) Nondimensional Specific Energy Index for Methane Pyrolysis in Thermal Plasma .....</b>	<b>883</b>
<i>Tianyang Li, Christophe Rehmert, Yan Cheng, Yi Cheng</i>	
<b>(557d) Long Term Stability and Operational Limits of Lithium Sulphate for Thermal Energy Storage.....</b>	<b>884</b>
<i>Alicia Bayon, Ming Liu, Frank Bruno, Jim Hinkley</i>	
<b>(557h) Thermal Properties and Storage Analysis of Nano Enhanced Organic Phase Change Material (NEOPCM) for Thermal Energy Storage Application .....</b>	<b>885</b>
<i>Arun Kumar, Shailendra K. Shukla, Sambasiva Kola</i>	
<b>(557i) Thermal Properties and Heat Transfer Analysis of Al<sub>2</sub>O<sub>3</sub> As a Nano Particle Dispersed in the Base Mixture of Therminol VP -1 and Water .....</b>	<b>886</b>
<i>Arun Kumar, Shailendra K. Shukla, Govardhan Kurva</i>	
<b>(558a) Conversion of Cheese Whey to Lactobionic Acid.....</b>	<b>887</b>
<i>Hui Lin, Xin Zhou, Takao Kasuga, Yong Xu, Zhiliang (Julia) Fan</i>	
<b>(558b) Predictive Model and Bioconversion of Mixed Feedstocks.....</b>	<b>888</b>
<i>Akash Narani, Phil Coffman, Matthew Miller, Firehiwot Tachea, Chyi-Shin Chen, Chenlin Li, Allison E. Ray, Todd Pray, Deepthi Tanjore</i>	
<b>(558c) Two-Phase Kinetics of Enzymatic Depolymerization of Hemicellulose to Soluble Sugars for Liquid Biofuel Production.....</b>	<b>889</b>
<i>Sajal K. Dutta, Saikat Chakraborty</i>	
<b>(558d) Selective Fermentation of Six Carbons Sugars from Hot-Water Hardwood Extract Hydrolysates.....</b>	<b>890</b>
<i>Shijie Liu, Zheng Liu</i>	
<b>(558f) Effect Temperature and Flow Rate on Lhw Pretreatment SB: Kinetic Study .....</b>	<b>891</b>
<i>Yu Zhang, Xinshu Zhuang, Jingliang Xu, Zhenhong Yuan</i>	
<b>(564a) Molecular-Level Kinetic Model Informed Life Cycle Analysis of Green Diesel Production .....</b>	<b>892</b>
<i>Pratyush Agarwal, Juan Lucio-Vega, Scott R. Horton, Michael T. Klein</i>	
<b>(564b) Application of the Advanced Distillation Curve Method to Characterize Two Alternative Transportation Fuels Prepared from the Pyrolysis of Waste Plastic .....</b>	<b>893</b>
<i>Megan Harries, Thomas Bruno</i>	
<b>(564c) Application of Real-Component Based Molecular Characterization on Petroleum Refinery Simulation .....</b>	<b>894</b>
<i>Meng Wang, Chau-Chyun Chen</i>	
<b>(564d) Economic Design of Bioconversion Process: Natural Gas to Isobutanol.....</b>	<b>895</b>
<i>Christina Bodarky, Bryan Yeh</i>	
<b>(564e) Techno-Economic Analysis of Indirect, Direct, and Hybrid Coal-Biomass to Liquids (CBTL) Plants with CO<sub>2</sub> Capture and Storage (CCS).....</b>	<b>896</b>
<i>Yuan Jiang, Debangsu Bhattacharyya</i>	
<b>(564f) Finished Fuel Blending Models for Assessing Integration of Biomass-Derived Products with Petroleum Refinery Products.....</b>	<b>897</b>
<i>Asad H. Sahir, Michael Talmadge, Mary Bidy</i>	
<b>(567a) R-HB Production from Glucose By B. Cepacia .....</b>	<b>898</b>
<i>Shijie Liu, Emma E Putman</i>	
<b>(567b) Process Strategies for High Titters of Lipid Production By Oleaginous Yeasts in Undetoxified Hydrolyzates of Lignocellulosic Biomass .....</b>	<b>899</b>
<i>Patricia J. Slininger, Bruce S. Dien, Cletus P. Kurtzman, Bryan R. Moser, Erica L. Bakota, Stephanie R. Thompson, Patricia J. O'Bryan, Michael A. Cotta, Venkatesh Balan, Mingjie Jin, Leonardo Da Costa Sousa, Bruce E. Dale</i>	
<b>(567c) Evaluation of Alcohol-to-Jet (ATJ) Conversion Technology for Renewable Jet Fuel .....</b>	<b>900</b>
<i>Scott Geleynse, Xiao Zhang, Manuel Garcia-Perez, Michael Wolcott</i>	
<b>(567d) Kinetics of the Enzymatic Hydrolysis of Paper Pulp Fibers.....</b>	<b>901</b>
<i>Rengasamy Kasinathan, Byeong Cheol Min, Ramarao Bandaru</i>	

<b>(567e) Comparing Sugar Titrers and Ethanol Yields from Fed Batch Fermentation of Celf and DA Pretreated Poplar Solids at High Glucan Loadings</b> .....	902
<i>Rachna Dhir, Charles M. Cai, Charles Wyman</i>	
<b>(567f) Co-Production of Bioethanol and Bio-Lactic Acid in a Biorefinery Concept: A Comprehensive Study</b> .....	903
<i>Mohsen Alimandegari</i>	
<b>(567g) Thermophiles and Their Thermostable Enzymes in Biofuel Synthesis</b> .....	904
<i>Rajesh Sani</i>	
<b>(572a) Improving the Energy Efficiency of Carbon Capture Processes – Combining Enzyme Accelerated Solvent Systems and Improved Contacting Equipment</b> .....	905
<i>Mathias Leimbrink, Katharina Kupitz, Kolja Neumann, Andrzej Górak, Mirko Skiborowski</i>	
<b>(572b) Boosting the Multienzymatic Conversion of CO<sub>2</sub> through Spatially Separated Immobilization Strategy</b> .....	908
<i>Jiafu Shi, Zhongyi Jiang</i>	
<b>(572c) Evaluation of Consumption Energy in CO<sub>2</sub> Absorption Processes with Two-Liquid Phase Separation Type</b> .....	909
<i>Takehiro Esaki, Hiroshi Machida, Hirotoshi Horioe, Tsuyoshi Yamaguchi</i>	
<b>(572d) The Influence of Dissociation Constants on the Kinetics of Carbon Dioxide Absorption in Aqueous Tertiary Amines Solutions Containing Carbonic Anhydrase</b> .....	910
<i>Bin Liu, Xiao Luo, Zhiwu Liang, Paitoon Tontiwachwuthikul</i>	
<b>(572e) A Study of Porous Support Amine-IL Binary System for CO<sub>2</sub> Capture</b> .....	913
<i>Min Xiao, Helei Liu, Raphael Idem, Paitoon Tontiwachwuthikul, Zhiwu Liang</i>	
<b>(572f) Novel Sorbents for Effective CO<sub>2</sub> Capture, Separation and Storage By Using Porous Polymers</b> .....	920
<i>Mert Atilhan, Santiago Aparicio, Cafer T. Yavuz</i>	
<b>(572g) Carbonic Anhydrase Enhanced Carbon Capture: Kinetic Measurements and Pilot Plant Trials</b> .....	927
<i>Arne Gladis, Maria T. Gundersen, Philip L. Fosbøl, John M. Woodley, Nicolas von Solms</i>	
<b>(574a) Production of Terephthalate Esters Via Diels-Alder Cycloaddition-Dehydration Reactions of 1,2-Furandicarboxylate Esters and Ethylene</b> .....	928
<i>Marat Orazov, Mark E. Davis</i>	
<b>(574c) Quantifying Lewis Acid Sites in Zeolites That Catalyze Glucose Isomerization</b> .....	929
<i>James W. Harris, Michael J. Cordon, Juan C. Vega-Vila, Fabio H. Ribeiro, Rajamani Gounder</i>	
<b>(574d) Designing Cooperative Interactions to Tune Catalytic Activity and Selectivity for Biomass Conversion</b> .....	930
<i>Nicholas Brunelli, Nitish Deshpande, Aamena Parulkar, Frédéric Perras, Marek Pruski</i>	
<b>(574e) Lewis Acid Zeolite Catalysts for Tandem Diels-Alder Cycloaddition and Dehydration of Dimethylfuran and Ethylene to Renewable p-Xylene</b> .....	931
<i>Hong Je Cho, Chun-Chih Chang, Jingye Yu, Raymond J. Gorte, Paul J. Dauenhauer, Wei Fan</i>	
<b>(574f) Comparative Studies of Grafted Fe(III) and Ti(IV) Active Sites on Siliceous Supports: Crystalline Delaminated Zeolite Vs. Amorphous Silica</b> .....	932
<i>Nicolás A. Grosso Giordano, Alexander Yeh, Andrew Solovyov, Alexander Okrut, Stacey I. Zones, Alexander Katz</i>	
<b>(574g) A Liquid Phase Spectroscopic Study of the Effect of Liquid Water on Acid Sites of NaY</b> .....	933
<i>Bingjun Xu, Nicholas Gould</i>	
<b>(576a) Gasification Reactivity of Model Refuse Derived Fuel (RDF) Char and Its Components in CO<sub>2</sub> and Steam</b> .....	934
<i>Sireesha Aluri, Pradeep K. Agrawal, John D. Muzzy, Carsten Sievers, Derrick W Flick, Brien Stears, John Henley</i>	
<b>(576b) Catalytic Hydrotreatment of Pyrolysis Oil Model Compounds in a Batch Reactor</b> .....	935
<i>LiLu Funkenbusch, Michael Mullins, Louise Olsson</i>	
<b>(576c) Supercritical Fluid Processing of Biomass-Derived Pyrolysis Oil</b> .....	936
<i>Ted J. Amundsen, Helena Hagelin-Weaver</i>	
<b>(576d) Commodity Chemicals from Lignocellulosic Biomass: Conversion of Furfural into 1,5-Pentanediol</b> .....	937
<i>Kefeng Huang, Kevin J. Barnett, Zachary Brentzel, James A. Dumesic, George W. Huber, Christos T. Maravelias</i>	
<b>(576e) Cyclization and Dehydration of Aldaric Acids to 2,5-Furandicarboxylic Acid</b> .....	938
<i>Matthew Gattinger, Edna J. Molina, Andres Sanchez, Evan Wegener, Lars Peereboom, Dennis J. Miller</i>	
<b>(576f) Thermo-Catalytic Conversion of Biomass Derived Lipids to Fuels and Chemicals over HZSM-5</b> .....	939
<i>Yaser Shirazi, Sridhar Viamajala, Sasidhar Varanasi</i>	
<b>(580a) An Ontology Supported Integration Framework for Models and Data in Biorefining</b> .....	940
<i>Linsey Koo, Nikolaos Trokanas, Franjo Cecelja</i>	
<b>(580b) A Biorefinery Boutique Made in Switzerland</b> .....	941
<i>Merten Morales, Michael Ehrenstein, Johanna Dragan, Sudharsan Ravi, Stavros Papadokostantakis, Elisabet Capón-García, Konrad Hungerbühler</i>	

<b>(580c) New Short-Cut Tools for Early-Stage Investment Evaluation of Biorefineries</b> .....	942
<i>Mirela Tsagkari, Jean-Luc Couturier, Antonis C. Kokossis, Jean-Luc Dubois</i>	
<b>(580d) Global Sensitivity Analysis of Economic Assessment of Early Stage Process Design: The Case of the Glycerol Biorefinery</b> .....	943
<i>Gürkan Sin, Carina Gargalo, Ana Isabel Carvalho, Krist V. Gernaey</i>	
<b>(580e) General Bio-Separation Superstructure Optimization Framework</b> .....	944
<i>Wenzhao (Tony) Wu, Christos T. Maravelias, Kirti Yenkie</i>	
<b>(580f) Technoeconomic Study of AB Synthesis for Biobutanol Production</b> .....	947
<i>Santiago Malmierca, Rebeca Díez, Ana I Paniagua, Mariano Martin</i>	
<b>(580g) Effect of Market and Technical Parameter Uncertainties on the Optimal Design of Integrated Biorefineries</b> .....	948
<i>Aryan Geraili, Jose Romagnoli</i>	
<b>(589a) Resource Recovery from Municipal Solid Wastes: A Case Study in the UK</b> .....	949
<i>Kok Siew Ng, Jhuma Sadhukhan, Mobolaji Shemfe</i>	
<b>(589b) The Case of Making Fuel Oil from Sanitary Sewage</b> .....	950
<i>Dhan Lord Fortela, Rafael Hernandez, Mark Zappi, William T French, Emmanuel Revellame, Andro Mondala, William Holmes</i>	
<b>(589c) Synthetic Diesel Production through Catalytic Pyrolysis of Biomass-Waste Tire Mixtures</b> .....	951
<i>Rocio Sierra, Daniel Sanchez</i>	
<b>(589d) Conversion of Municipal Solid Waste to Methyl Ketone Using Ionic Liquid Based Process</b> .....	952
<i>Jipeng Yan, Ling Liang, Qian He, Tina Luong, Feng Xu, Chenlin Li, Vicki S. Thompson, Ee-Been Goh, Harry R. Beller, Blake Simmons, Todd Pray, Seema Singh, Ning Sun</i>	
<b>(589e) Upgrading of Hydrothermal Liquefaction Biocrude Oil Converted from Wet Biowaste</b> .....	953
<i>Wan-Ting Chen, Yuanhui Zhang, Lance Schideman, B.K. Sharma, Peng Zhang</i>	
<b>(589f) Evaluation of Optimum Cell Disruption for Microbial Lipid Extraction Using High Pressure CO<sub>2</sub></b> .....	954
<i>Md Howlader, W. Todd French, Neeraj Rai</i>	
<b>(599a) Porous Structure Based Electrocatalysts for High Performance Fuel Cells</b> .....	955
<i>Jinwoo Lee</i>	
<b>(599b) Design of Heterostructure Alloy Nanoparticles for Photocatalysis of CO<sub>2</sub> Reduction</b> .....	956
<i>Doh C. Lee</i>	
<b>(599c) Nanostructured Composite Intermediate-Temperature Solid Acid Fuel Cells Fabricated By Needleless Electrospinning</b> .....	957
<i>Norbert Radacsi, Fernando Campos, Calum R. Chisholm, Konstantinos P. Giapis</i>	
<b>(599d) Optimization of Pt/C Particles Electrocatalytic Activity By the Control of Carbon Nanostructures Via a Hybrid Aerosol-Colloidal Process</b> .....	958
<i>Aditya F. Arif, Ratna Balgis, Takashi Ogi, Kikuo Okuyama</i>	
<b>(599e) Highly Active Robust F Doped Transition Metal Oxide Based Solid Solution Electro-Catalyst for Acidic Medium Oxygen Evolution Reaction in PEM Based Water Electrolysis</b> .....	959
<i>Shrinath Ghadge, Prasad P. Patel, Moni Kanchan Datta, Oleg Velikokhatnyi, Prashanth Jampani, Prashant Kumta</i>	
<b>(599f) Superwetting Nanoarray Electrodes for Gas-Involved Electrocatalysis</b> .....	962
<i>Xiaoming Sun, Yingjie Li, Wenwen Xu, Zhiyi Lu</i>	
<b>(599g) Nanocatalysts for Water Splitting</b> .....	963
<i>Bing Joe Hwang, Amare Aregaegn Dubale, Men-Che Tsai</i>	
<b>(599h) Hydrogen Generation from Hydrous Hydrazine Over Nickel-Doped Ceria Catalysts Prepared By Solution Combustion Synthesis</b> .....	964
<i>Wooram Kang, Derya Oncel Ozgur, Arvind Varma</i>	
<b>(603a) Network Structure in Hybrid Solid Polymer Electrolytes (Invited Talk)</b> .....	965
<i>Christopher Li, Qiwei Pan</i>	
<b>(603b) Design of High Transference Number Battery Electrolytes</b> .....	966
<i>Hilda G. Buss, Bryan D. McCloskey</i>	
<b>(603c) Effect of Transporting Enhancer in Fe<sub>3</sub>O<sub>4</sub> Li-Ion Battery Anodes</b> .....	967
<i>Yo Han Kwon, Krysten Minnici, Matthew M. Huie, Amy C. Marschilok, Kenneth J. Takeuchi, Esther S. Takeuchi, Elsa Reichmanis</i>	
<b>(603d) Integration of Ultrathin Polyaniline Films into Carbide Derived Carbon Supercapacitors Via Oxidative Chemical Vapor Deposition</b> .....	968
<i>Yuriy Y. Smolin, Katherine L. Van Aken, Muhammad Boota, Masoud Soroush, Yury Gogotsi, Kenneth K.S. Lau</i>	
<b>(603e) Controlling the Li-Air (O<sub>2</sub>) Discharge Process with a Gel Polymer Electrolyte</b> .....	969
<i>Chibueze Amanchukwu, Paula Hammond</i>	
<b>(603f) Water-Polymer Mobility and Distribution in Hydrated Aromatic Ionomer Thin Films</b> .....	970
<i>Shudipto Konika Dishari, Christopher Rumble, Mark Maroncelli, Joseph Dura, Michael Hickner</i>	



<b>(603g) Highly Proton-Conductive Polyelectrolyte Membranes with Supramolecularly Suppressed Water Swelling</b> .....	971
<i>Joseph Aboki, Shuangjiang Luo, Ruilan Guo</i>	
<b>(603h) Role of Oligomeric Additives on P3HT/PCBM Domain Interfaces and Photovoltaic Performance</b> .....	972
<i>S. Michael Kilbey II, Zach Seibers, Enrique D. Gomez, Thinh Le</i>	
<b>(603i) Elucidating the Charge Transfer Mechanism in Conjugated Radical Polymers</b> .....	973
<i>Fei Li, Jodie Lutkenhaus</i>	
<b>(609a) The Solar Fuels Research Program within the Australian Solar Thermal Research Initiative (ASTRI)</b> .....	974
<i>Woei Saw, Jason Alvino, Gunther Andersson, Peter J Ashman, Alicia Bayon, Christian Doonan, Peijun Guo, Jim Hinkley, Ramesh Karunakaran, Wojciech Lipinski, Dusan Losic, Greg Metha, John Pye, Ellen Stechel, Aldo Steinfeld, Philip van Eyk, Mahesh Venkataraman, Alan W. Weimer, Graham J. Nathan</i>	
<b>(609b) Solar Thermochemical CO<sub>2</sub> Splitting Via Redox Cycling with Low-Cost Metal Oxide Nanostructures</b> .....	975
<i>Xiang Gao, Peter Kreider, Alicia Bayon, Thomas Gengenbach, Jim Hinkley, Wojciech Lipinski, Antonio Tricoli</i>	
<b>(609c) Evaluating the Effect of Modeling Variables and Experimental Conditions on Material Development for Solar Thermochemical Water Splitting</b> .....	976
<i>Samantha L. Miller, Ryan Trottier, Kevin Sun, Alan W. Weimer, Charles B. Musgrave</i>	
<b>(609d) Continuous Splitting of CO<sub>2</sub> into CO and O<sub>2</sub> Using an Isothermal Redox Membrane Reactor</b> .....	977
<i>Maria Z. Tou, Roberto Castiglioni, Ronald Michalsky, Aldo Steinfeld</i>	
<b>(609e) Experimental Investigation of Methane Reformation Via the Nonstoichiometric Ceria Redox Cycle</b> .....	978
<i>Kent Warren, Benjamin Greek, Kelvin Randhir, David Hahn, Jonathan R. Scheffe</i>	
<b>(609f) Membrane-Free Photo-Electrochemical Cell Design Involving Flow Field Hydrogen Separation</b> .....	979
<i>Isaac Gentle, Klaus Hellgardt</i>	
<b>(712f) Solar High-Temperature Processes for Solar Fuels Production and Solar Energy Storage Applications</b> .....	980
<i>Christos Agrafiotis, Martin Roeb, Christian Sattler, Dennis Thomey</i>	
<b>(619at) CO<sub>2</sub>/Brine/Rock Interactions in Lower Tuscaloosa Formation</b> .....	983
<i>Yee Soong, Bret H. Howard, Dustin Crandall, Bob McLendon, Robert Dilmore, Liwei Zhang, Ronghong Lin, Igor Haljasmaa</i>	
<b>(619x) Biofuel Production Via Thermochemical Conversion of Algae and Optimizing Coproduct Utilization</b> .....	984
<i>Tapaswy Muppaneni, Kodanda Phani Raj Dandamudi, Melvin Mathew, Thinesh Selvaratnam, Peter Lammers, Shuguang Deng</i>	
<b>(619am) Hydrothermal Pretreatment of Rice Husk with Biodiesel Waste As the Reaction Medium</b> .....	985
<i>Novi Syaftika, Yukihiko Matsumura</i>	
<b>(619as) Thermal Resistance Network Model for Heat Pipe - PCM Based Cool Storage for Air Cooled Condenser Systems</b> .....	986
<i>Sean Hoenig, Chien-Hua Chen, CJ Pan</i>	
<b>(619c) Life Cycle Carbon Footprint of Renewable Electricity Generation from Aspen Forest Intensive Harvest in Wisconsin, USA</b> .....	987
<i>Jiqing Fan, Sangpil Ko, Pasi Lautala, Michelle Cisz, Sigrid Resh, David R. Shonnard</i>	
<b>(619v) Modeling Differential Catalytic Hydrotreatment of Surrogate Compounds for Pyrolysis Oil</b> .....	988
<i>LiLu Funkenbusch, Michael Mullins</i>	
<b>(619ap) Pretreatment of Black Liquor to Improve the Recovery Boiler Operation</b> .....	989
<i>Tobias Richards</i>	
<b>(619s) Characterization of Physical Properties of Macroalgal Pyrolysis Products for Process Simulation</b> .....	990
<i>Boris Brigljevic, J. Jay Liu</i>	
<b>(619y) Experimental Investigation on Expanded Granular Sludge Bed Reactor to Maximize the Methane Gas Production in the Biogas</b> .....	991
<i>Haider Al-Rubaye, Joseph D. Smith</i>	
<b>(619ab) Modelling of Exponential and Stationary Phases in Microalgae Growth Using a Population Balance Equation</b> .....	992
<i>Ergys Pahija, Chi Wai Hui</i>	
<b>(619o) Novel Process of Biofuel Production from Acid Oil and Hydroz Bioethanol Using Ion-Exchange Resin; II. Introducing Life Cycle Perspectives in Optimization of Operating Conditions</b> .....	993
<i>Yasuhiro Fukushima, Shaolin Peng, I-Ching Chen, Hajime Ohno, Naomi Shibasaki-Kitakawa</i>	
<b>(619an) Advances in the Pyrolysis of Municipal Solid Waste Mixtures</b> .....	994
<i>Ulises R. Gracida-Alvarez, Julio C. Sacramento-Rivero, David R. Shonnard</i>	

<b>(619aq) Development of Methanol Synthesis Process Using Self-Heat Recuperation</b> .....	995
<i>Yasuki Kansha, Masanori Ishizuka, Atsushi Tsutsumi, Yasuaki Kambe, Takuya Okamura, Jun Yoshihara</i>	
<b>(619b) The Impact of Fugitive Particulate Matter on the Environmental Health and Sustainability of Dry and Arid Regions</b> .....	996
<i>Konstantinos E. Kakosimos, Prashant Kumar, Hala Hassan</i>	
<b>(619ag) Viologen-Catalyzed Carbohydrate Oxidation for Biofuel Cell Applications</b> .....	997
<i>Jennifer A. Stevens, Scott D. Carter, John Harb, Gerald D. Watt, Randy S. Lewis</i>	
<b>(619k) Multi-Objective Optimization of Integrated Aspen Plus Unsteady-State Batch and Fed-Batch Fermentation and in Situ Gas Stripping Simulations</b> .....	998
<i>Kwabena Darkwah, Barbara L. Knutson, Jeffrey Seay</i>	
<b>(619aw) Characterization Based Design of Ionic Liquids for CO<sub>2</sub> Absorption</b> .....	999
<i>Sarah Davis, Mario Richard Eden</i>	
<b>(439e) Simultaneous Optimization for Heat-Exchanger Network Synthesis of Natural Gas Combined Cycle Power Plant Integrated with Post-Combustion CO<sub>2</sub> Capture and Compression</b> .....	1000
<i>Gerardo G. Esquivel-Patiño, Fabricio Nápoles-Rivera</i>	
<b>(619m) Overview on Evaluation of Sustainable Biofuel Conversion Processes</b> .....	1001
<i>Eric C. D. Tan</i>	
<b>(619bb) The Role of ‘Free Radical Based Mechanisms’ in Wood-Feeding Termites for the Deconstruction of Lignocellulosic Biomass</b> .....	1002
<i>Innu Chaudhary, Shulin Chen</i>	
<b>(619f) Life-Cycle Assessment of Biofuels and Chemicals from Unconventional Methane Feedstocks</b> .....	1003
<i>Robert M. Handler, David R. Shonnard, Ignasi Palou-Rivera</i>	
<b>(619i) Climate Change Impacts of Bioethanol Production from Willow</b> .....	1004
<i>Obste Therasme, Marie-Odile Fortier, Timothy A. Volk, Thomas Amidon</i>	
<b>(663d) CO<sub>2</sub> and Water Adsorption on Seeded Growth of Mg-MOF-74 on Carbon-Nanotubes</b> .....	1005
<i>Abedeh Gholidoust, Ludovic F. Dumée, Zaher Hashisho</i>	
<b>(619ad) Optimization of Biomass Processing Through Physical Fractionation</b> .....	1006
<i>Lisaura Maldonado, Aditya Bhalla, David Hodge</i>	
<b>(619aa) Kinetics Modeling of Fed-Batch Lipid Accumulation of Activated Sludge</b> .....	1007
<i>Bimi Shrestha, Dhan Lord Fortela, Rafael Hernandez</i>	
<b>(619ak) Pyrolytic Fractionation of Algal Biomass: Catalytic Conversion of the Resulting Vapors to Fuels and Chemicals</b> .....	1008
<i>Yaser Shirazi, Sridhar Viamajala, Sasidhar Varanasi</i>	
<b>(619ai) Biomethane Potential Determinants of Different Agro Industrial Substrates</b> .....	1009
<i>Dimosthenis Sarigiannis, Fokion Kaldis, Ioannis Zarkadas</i>	
<b>(619aj) Flash Pyrolysis and Fractional Pyrolysis of Oleaginous Biomass in a Fluidized-Bed Reactor</b> .....	1010
<i>Brook Urban, Yaser Shirazi, Balakrishna Maddi, Sridhar Viamajala, Sasidhar Varanasi</i>	
<b>(619h) Life Cycle Assessment of Renewable Hydrotreated Fuels from Castor</b> .....	1011
<i>Rogelio Sotelo-Boyás, Luis G. Sanchez-Gutierrez, Adan Mendoza-Villalba, Jonatan Hernandez-Diaz, Fabiola F. Lara-Olague</i>	
<b>(619w) Enhanced Design of Hybrid Distillation Processes for Separation of Biomass Derivatives</b> .....	1012
<i>Moonyong Lee, Le Cao Nhien, Nguyen Van Duc Long, Kee-Kahb Koo</i>	
<b>(619g) A Chemical Engineer’s Guide to Contemporary Problems of Climate, Energy and Environment</b> .....	1013
<i>Angela D. Lueking</i>	
<b>(619p) Residential Wood Pellet Heating System Optimization Using Process Dynamic Simulation</b> .....	1014
<i>Kui Wang, Philip K. Hopke, Marco Satyro</i>	
<b>(619ba) Introduction and Study on Electron-Beam Assisted Stabilization Process for Cost-Effective Manufacture of Carbon Fibers: Process to Bring about Wide Application of Lightweight Structural Composites for Sustainable Environment</b> .....	1015
<i>Sejoon Park</i>	
<b>(619e) Life Cycle Assessment of Pharmaceutical Manufacturing Processes</b> .....	1016
<i>Cher Kian Lee, Hsien Hui Khoo, Reginald B.H. Tan</i>	
<b>(619ax) Advancing Building Materials Product Transparency with the Living Product Challenge</b> .....	1017
<i>Richelle C. Thomas</i>	
<b>(619l) Process Design, Modification, and Sustainability Assessment of Coal and Biomass Co-Fired Plants for Generation of Transportation Fuel: A Case Study in Kentucky</b> .....	1018
<i>Chandni Joshi, Aida Amini Rankouhi, Yinlun Huang, Jeffrey Seay</i>	
<b>(619ay) Synthesis, Properties, and Processing of Melt-Spinnable Acrylonitrile Copolymers</b> .....	1019
<i>Hyeonuk Yeo, Sejoon Park</i>	
<b>(622a) Self-Assembly of Antibody-Polymer Conjugates into Novel Sensing Materials</b> .....	1020
<i>Bradley D. Olsen, Xuehui Dong, Allie Obermeyer</i>	

<b>(622c) Structural Studies to Determine the Mechanisms of Biobased Nanoparticle Synthesis</b> .....	1021
<i>Amar Thaker, Karthik Pushpavanam, Kaushal Rege, Brent L. Nannenga</i>	
<b>(622d) Biopolymers from a Thermophile: Production, Characterization, and Application</b> .....	1022
<i>Jia Wang, Rajesh K. Sani, David R. Salem</i>	
<b>(622f) Genetically Encodable Acoustomagnetic Reporters for Background-Free Molecular and Cellular MRI</b> .....	1023
<i>George J. Lu, Arash Farhadi, Jerzy Szablowski, Samuel Barnes, Anupama Lakshmanan, Raymond W. Bourdeau, Mikhail G. Shapiro</i>	
<b>(622g) How Bolt Threads Is Using Chemical and Process Engineering to Grow Its Business of Engineering Silk (Featured Presentation)</b> .....	1024
<i>Daniel Widmaier</i>	
<b>(628a) Catalytic Process for Levoglucosan Conversion into Distillate Range Molecules</b> .....	1025
<i>Mrunmayi D. Kumbhalkar, Daniel J. McClelland, Nathaniel Eagan, J. Scott Buchanan, George W. Huber, James Dumesic</i>	
<b>(628b) Hydrodeoxygenation of Pinyon Juniper Catalytic Pyrolysis Oil to Hydrocarbon Fuels</b> .....	1026
<i>Hossein Jahromi, Foster Agblevor</i>	
<b>(628c) A Synthetic Biology Chassis for Lignin Valorization into Muconic Acid and Other Value-Added Chemicals</b> .....	1027
<i>Weihua Wu, Tannoy Dutta, Arul Varman, Dominique Loqué, Aymerick Eudes, Seema Singh</i>	
<b>(628d) Porous Carbonaceous Solid Acids Derived from Farm Animal Waste and Their Use in Catalyzing Biomass Transformation</b> .....	1028
<i>Iman Noshadi, Baishali Kanjilal, Fujian Liu</i>	
<b>(628e) Analysis of Carboxylic Acids in the Biocrude Derived from Hydrothermal Liquefaction of Lignocellulosic Biomass</b> .....	1029
<i>Richa Tungal, Rajesh Shende</i>	
<b>(628g) Catalytic Pyrolysis of Sugar Cane Bagasse and Rice Straw</b> .....	1030
<i>Sedat H. Beis, Foster Agblevor</i>	
<b>(629a) Engineering Highly Active Brookite Titania Nanorods for Sustainable Hydrogen Production</b> .....	1031
<i>Matteo Carnello, Tiziano Montini, Sergey Smolin, Jacqueline Priebe, Juan J. Delgado Jaén, Vicky Doan-Nguyen, Ian McKay, Jay Schwalbe, Marga-Martina Pohl, Thomas Gordon, Jason B. Baxter, Angelika Brückner, Paolo Fornasiero, Christopher B. Murray</i>	
<b>(629b) Hydrogen Production Via Photocatalytic Water Splitting over Mesoporous Pt/TiO<sub>2</sub></b> .....	1032
<i>Fabricio Guayaquil Sosa, Benito Serrano, Hugo de Lasa</i>	
<b>(629c) How Ceria Redox Materials Split H<sub>2</sub>O and CO<sub>2</sub> with Concentrated Solar Energy into H<sub>2</sub>, CO, and O<sub>2</sub></b> .....	1033
<i>Ronald Michalsky, Aldo Steinfeld</i>	
<b>(629d) Methane Conversion to Syngas Using Dopant Modified Metal Oxide Composites in Chemical Looping Reforming</b> .....	1034
<i>Zhuo Cheng, Lang Qin, Mengqing Guo, Mingyuan Xu, Jonathan A. Fan, Liang-Shih Fan</i>	
<b>(629e) A New Thin Layered Structural Coating on a Metal Substrate for Enhanced Hydrogen Production from Steam Methane Reforming</b> .....	1035
<i>Michael Lugo, Marco Castaldi, Dean Modroukas, Andrew W. Davis, Rajinder Gill, Florent Minette, Juray De Wilde</i>	
<b>(629f) Promotion Mechanisms of Iron Oxide-Based High Temperature-Water Gas Shift (HT-WGS) Catalysts By Chromium and Copper</b> .....	1036
<i>Tulio Rocha, Minghui Zhu, Axel Knop-Gericke, Israel Wachs, Robert Schlogl</i>	
<b>(629g) Catalytic Ammonia Decomposition to Hydrogen and Nitrogen on Supported Nanosized and Single-Site Cobalt Catalysts: Effects of Atomicity, Ligand Environment and Support</b> .....	1037
<i>Konstantin V. Khivantsev, Fahad Almalki, Miao Yu</i>	
<b>(630a) Refineries in a Carbon Constrained Future - The Potential for Facility-Wide CO<sub>2</sub> Capture at Plant Utilities</b> .....	1038
<i>William Morrow, John J. Marano</i>	
<b>(630b) CO<sub>2</sub>-Utilization in Chemicals Production Based on Evidence from Start-Ups and Literature</b> .....	1039
<i>Arno Zimmermann, Marvin Kant, Reinhard Schomäcker, Jan Kratzer, Christoph Gürtler, Jochen Norwig</i>	
<b>(630c) Assessing the Potential of CO<sub>2</sub> Utilization with an Integrated Framework for Producing Power and Chemicals</b> .....	1040
<i>Arnab Dutta, Shamsuzzaman Farooq, Iftekar A. Karimi, Saif A. Khan</i>	
<b>(630d) CO<sub>2</sub> Utilization for Methanol Production As an Intermediate for Formaldehyde: Technoeconomic and Sustainability Assessment of the Value Chain in the Case of Sweden</b> .....	1041
<i>Stavros Papadokostantakis, Alexander H.O. Sörensen</i>	

<b>(630e) Life Cycle Emissions Assessment of a Renewable Fuel Process: Impact of Catalyst Performance on the Net GHG Emissions of Methanol Production By Direct Electrocatalytic Reduction of CO<sub>2</sub></b> .....	1042
<i>Matthew Pellow, Sally Benson</i>	
<b>(630f) Integration of Sustainability Assessment in the Early Design Phases of Amine Based Post-Combustion CO<sub>2</sub> Capture</b> .....	1043
<i>Sara Badr, Robert Bennett, Graeme D. Puxty, Stavros Papadokostantakis, Konrad Hungerbuehler</i>	
<b>(630g) Optimal Design and Techno-Economic Analysis of CO<sub>2</sub> Mineralization Process Using Aqueous NaOH</b> .....	1044
<i>Dabin Jung, Seung Hwan Oh, Kosan Roh, Jay H. Lee</i>	
<b>(630h) New Conceptual Design Models for Carbon Capture and Utilization Via Carbonate-Based Construction Materials</b> .....	1045
<i>Thomas Farmer, Bradley F. Chmelka, Michael F. Doherty</i>	
<b>(631a) Renewable N-Containing Chemicals Production By Ammonization of Biomass Derived Lipid over Heterogeneous Catalyst</b> .....	1046
<i>Yaser Shirazi, Sridhar Viamajala, Sasidhar Varanasi</i>	
<b>(631b) Catalytic Conversion of 5-Hydroxymethylfurfural into Tetrahydrofuran–Dimethanol in Aqueous Media Using a Continuous-Flow Reactor</b> .....	1047
<i>David Chadwick, Klaus Hellgardt, Sergio Martins-Lima</i>	
<b>(631c) Catalytic Co-Hydropyrolysis of Biomass and Plastics for Improved Product Quality</b> .....	1048
<i>Xianglan Bai</i>	
<b>(631d) Pt Catalysts for Efficient Aerobic Oxidation of Glucose to Glucaric Acid in Water</b> .....	1049
<i>Basudeb Saha, Jechan Lee, Dion G. Vlachos</i>	
<b>(631e) Synthesis of Methyl Levulinate from Glucose Using Solid Acid Catalyst</b> .....	1050
<i>Yosuke Muranaka, Yusuke Nobuta, Isao Hasegawa, Taisuke Maki, Kazuhiro Mae</i>	
<b>(632a) Processing Carbonaceous Feedstock Using Ionic Liquids for Sustainable Carbon Engineering</b> .....	1051
<i>Chenlin Li, C. Luke Williams, Brad Thomas, Hongqiang Hu</i>	
<b>(632b) A New Lignin Based Polymer</b> .....	1052
<i>Kuan-Ting Lin, Ruoshui Ma, Xiao Zhang</i>	
<b>(632c) Process Modeling and Techno-Economic Assessment of the Conversion of Biorefinery Lignin to Dicarboxylic Acids</b> .....	1053
<i>Kitana Kaiphanliam, Mond Guo, Xiao Zhang</i>	
<b>(632d) Is Lignin an Ideal Source for Renewable Hydrocarbon Fuel?</b> .....	1054
<i>Mond Guo, Xiao Zhang</i>	
<b>(632e) Integration of Renewable Jet Fuel Production with the Pulp Industry through Alcohol Conversion</b> .....	1055
<i>Scott Geleynse, Xiao Zhang, Senthil Subramaniam</i>	
<b>(632f) Novel Solvent Deconstruction of Woody Biomass and Isolation of High Purity Lignin</b> .....	1056
<i>Karissa Garcia, Ruoshui Ma, Scott Geleynse, Xiao Zhang</i>	
<b>(636a) On the Systematic Integration of Different Generation Biorefineries</b> .....	1057
<i>Aikaterini D. Mountraki, Ana M. López Contreras, Bouchra Benjelloun Mlayah, Antonis C. Kokossis</i>	
<b>(636b) Use of Multi-Objective Optimization for Selecting Optimally Integrated Biorefinery Processes</b> .....	1058
<i>Ayse Dilan Celebi, Adriano Ensinas, Shivom Sharma, François Maréchal</i>	
<b>(636c) Process Models to Assess the Co-Processing of Gasoil and Bio-Based Feedstocks in Hydroprocessing Unit Operations</b> .....	1059
<i>Asad H. Sahir, Michael Talmadge, Mary Bidy, Mark Bearden, Steven Phillips, Susanne B. Jones</i>	
<b>(636e) Design and Economic Analysis of a Macroalgae-to-Butanol Process Via a Thermochemical Route</b> .....	1060
<i>Chinedu Okoli, Thomas A. Adams, J. Jay Liu, Boris Brigljevic</i>	
<b>(636f) Robust Optimization of Biomass and Natural Gas to Liquid Transportation Fuel Refineries: Process Synthesis Under Uncertainty in Feedstock and Product Prices</b> .....	1062
<i>Logan R. Matthews, Yannis A. Guzman, Onur Onel, Alexander M. Niziolek, Christodoulos A. Floudas</i>	
<b>(636g) Dynamic Modeling of a Continuous Acetone-Butanol-Ethanol (ABE) Fermentation Process</b> .....	1065
<i>Edward Buehler, Ali Mesbah</i>	
<b>(638a) An Overview of the U.S. Doe Carbon Storage Program’s Approach to Developing Safe, Effective Commercial Carbon Storage Technologies</b> .....	1066
<i>Erik Albenze, Kanwal Mahajan, Traci Rodosta</i>	
<b>(638b) Impacts of Realistic and Varying Rates of CO<sub>2</sub> Injection on Safe CO<sub>2</sub> Storage in the Bunter Sandstone of the Southern North Sea</b> .....	1067
<i>Clea Kolster, Niall Mac Dowell, Sam Krevor, Simeon Agada</i>	

<b>(638c) Geologic CO<sub>2</sub> Storage Leakage Detection with Statistical Analysis of Controlled-Release Field Data</b> .....	1068
<i>Megan Walsh, Brian McPherson</i>	
<b>(638d) A Numerical Simulation Update of the Aquistore CO<sub>2</sub> Storage Project</b> .....	1069
<i>Tao Jiang, Lawrence Pekot, Wesley D. Peck, James A. Sorensen, Charles D. Gorecki</i>	
<b>(638e) Lessons Learned in Near-Surface Monitoring for Large-Scale CO<sub>2</sub> Storage</b> .....	1070
<i>Leroux Kerryanne M., Kyle A. Glazewski, Nicholas S. Kalenze, Barry W. Botnen, Daniel J. Stepan, Ryan J. Klapperich, John A. Hamling</i>	
<b>(638f) Economic Modeling of Carbon Dioxide for Geologic Sequestration and Enhanced Oil Recovery in Jacksonburg-Stringtown Oil Field, West Virginia, USA</b> .....	1071
<i>Zhi Zhong, Timothy Carr</i>	
<b>(638g) Carbon Dioxide-Induced Liberation of Methane from Laboratory-Formed Methane Hydrates: A Pathway to Economical Carbon Sequestration</b> .....	1072
<i>Devinder Mahajan, Kristine Horvat, Tadanori Koga, Maya Endoh</i>	
<b>(645a) Long Life Cycle Lithium–Oxygen Battery Using Molybdenum Disulfide Nanoflakes</b> .....	1073
<i>Mohammad Asadi, Baharak Sayahpour, Amin Salehi-Khojin</i>	
<b>(645b) The Next Generation High Power, LiFePO<sub>4</sub> Cathode Material</b> .....	1074
<i>Maha Hammoud, Charlie Xu, Judy Laforest, Lucy Lee, Derek Johnson</i>	
<b>(645c) Solid State Thermal Reaction of NaOH and Mn<sub>3</sub>O<sub>4</sub> Drives the Formation of Sodium-Manganese Oxide Birnessite for Aqueous Electrochemical Energy Storage</b> .....	1075
<i>Xiaoqiang Shan, Xiaowei Teng</i>	
<b>(645d) Capacitive Behavior of Natural Biomaterials in High-Performance Renewable Supercapacitor</b> .....	1076
<i>Zhe Zhang, Arie Mulyadi, Yulin Deng</i>	
<b>(645e) Bipolar Plates for Redox Flow Batteries: Relating Conductivity to Morphology of Carbon-Based Polymer Composites</b> .....	1077
<i>Jiri Vrana, Martin Kroupa, Petr Mazur, Jan Dundalek, Jaromir Pocedic, Juraj Kosek</i>	
<b>(645f) Fabricating of High-Performance Functional Graphene Fibers for Micro-Capacitive Energy Storage</b> .....	1078
<i>Tianju Fan, Chunyan Zhao, Zhuangqing Xiao, Fangjun Guo, Yidong Liu, Hong Meng, Yong Min</i>	
<b>(645h) Solid Dispersion Flow Battery Material Synthesis and Battery Characterization</b> .....	1079
<i>Gary M. Koenig</i>	
<b>(645i) Highly Cyclable and Energy Dense Manganese Dioxide Cathodes for Advanced Alkaline Batteries</b> .....	1080
<i>Gautam G. Yadav, Joshua Gallaway, Michael Nyce, Sanjoy Banerjee</i>	
<b>(650a) Interfacial Assembly and Engineering of Ordered Functional Mesoporous Materials for Applications</b> .....	1081
<i>Dongyuan Zhao</i>	
<b>(650b) High-Energy Density Metal-Free Biobatteries Powered By Soft Drinks</b> .....	1082
<i>Zhiguang Zhu</i>	
<b>(650c) Lego-like Micropillar/Microwell Chip for High-Throughput Functional Analysis of Genes Encoding Pathogen-Specific Antimicrobial Enzymes</b> .....	1083
<i>Seok-Joon Kwon, Domyoung Kim, Inseon Lee, Jungbae Kim, Jonathan S. Dordick</i>	
<b>(650d) Chaperonin-Inspired Enzyme Protection By Mesoporous Silica</b> .....	1084
<i>Michele Lynch, Michael M. Nigra, Marc-Olivier Coppens</i>	
<b>(650e) Intermediate Channeling Via Nanoscale Confinement</b> .....	1085
<i>Kanchan Chavan, Scott Calabrese Barton</i>	
<b>(650f) Engineering Ultrastable Protein Scaffolds for the Controlled Assembly of Multifunctional Nanobiomaterials</b> .....	1086
<i>Samuel Lim, Dominic Glover, Nancy Sloan, Douglas S. Clark</i>	
<b>(650g) Concanavalin A Enabled High Performance Enzyme Cascades on Magnetic Nanoparticles</b> .....	1087
<i>You Yong, Jun Ge, Zheng Liu</i>	
<b>(650h) Design of a Heterogeneous Biocatalyst for Cofactor Regeneration and Improved Catalytic Characteristics</b> .....	1088
<i>Adam A. Caparco, Andreas S. Bommarius, Julie A. Champion</i>	
<b>(650i) Concanavalin A Coated Activated Carbon for Enzyme Immobilization</b> .....	1089
<i>Weina Xu, You Yong, Guoqiang Jiang, Zheng Liu</i>	
<b>(653a) R&amp;D Progress in Air Pollution Control Technologies in China (Featured talk)</b> .....	1090
<i>Yunfa Chen</i>	
<b>(653b) Removal of Toxic Chemicals Using Metal-Organic Frameworks</b> .....	1091
<i>Gregory W. Peterson</i>	
<b>(653c) Adsorption Energies of Light Hydrocarbons in Functionalized UiO-66(Zr)</b> .....	1092
<i>Michael D. Gross, Jennifer Buchanan</i>	

<b>(653d) Selective Gas Adsorption on Functionalized H3btc and Di-Isophthalate Based Metal Organic Frameworks</b> .....	1093
<i>Prudhviraj Medikonda, Sastri Chivukula, Sasidhar Gumma</i>	
<b>(653f) A One-Step Ion Exchange Method to Functionalized Zif-67 for Enhanced CO2 Capture</b> .....	1094
<i>Fujiao Song</i>	
<b>(653g) CO2 Capture in Uio-66-Type Metal-Organic Frameworks (MOFs)</b> .....	1096
<i>Dan Zhao</i>	
<b>(653h) Tuning the Kinetic Water Stability and Adsorption Interactions of Mg-MOF-74 By Partial Substitution with Co or Ni</b> .....	1097
<i>Yang Jiao, Cody R. Morelock, Nicholas C. Burtch, William P. Mounfield, Julian T. Hungerford, Krista S. Walton</i>	
<b>(664a) Redox Active Metal Oxide-Based Thermochemical Processes for Producing Solar Fuels and Storing Thermal Energy (Invited Talk)</b> .....	1098
<i>Ellen Stechel</i>	
<b>(664b) Doped Ceria for Solar Thermal Water Splitting: What Works, What Doesn't, and How to Improve It</b> .....	1099
<i>Christopher L. Muhich, Aldo Steinfeld</i>	
<b>(664c) Stabilizing SiC for Solar Thermal Water Splitting Applications</b> .....	1100
<i>Amanda Hoskins, Aidan Coffey, Charles B. Musgrave, Alan W. Weimer</i>	
<b>(664d) Development and Test Operation of a Demonstration Plant for Sulfuric Acid Splitting at the Dlr Concentrating Solar Power Tower Facility</b> .....	1101
<i>Dennis Thomey, Hans-Peter Streber, Alejandro Guerra Niehoff, Moises A. Romero Gonzales, Justin L. Lapp, Martin Roeb, Christian Sattler</i>	
<b>(664e) Modelling of a Continuous Solar Tubular Aerogel Reactor for the Thermochemical Reduction of CeO2: The Effect of Residence Time, Particle Diameter and Particle Loading</b> .....	1102
<i>Patricio J. Valades-Pelayo, Heidi I. Villafan-Vidales, Hernando Romero-Paredes, Camilo A. Arancibia-Bulnes</i>	
<b>(664f) Conceptual Analysis of Process Alternatives for Solar Thermochemical Methanol Production: The Role of Chemical Storage</b> .....	1103
<i>Bruno A. Calfa, Christos T. Maravelias</i>	
<b>(664g) Hercynite Reduction and ITM Membrane Oxygen Removal System for Solar Thermal Water Splitting</b> .....	1105
<i>Ibraheam Al-Shankiti, Yahya Al-Salik, Hicham Idriss, Alan W. Weimer</i>	
<b>(664h) Monte Carlo Method to Calculate the Lifetime Efficiency of a Solar Reactor for Reduction of Zinc Oxide</b> .....	1106
<i>Olivier Farges, J.J. Beziau, Mouna El Hafi</i>	
<b>(668a) A Model Algae Strain Extracellular Sugars: Genome Sequencing and Transcriptomic Analysis</b> .....	1109
<i>Brett M. Barney, Velmurugan Natarajan, Matthew Ariola</i>	
<b>(668b) Exploiting Models to Assess and Guide Genetic Engineering of Microalgae Strains</b> .....	1110
<i>Andrea Bernardi, Andrea Meneghesso, Giorgio Perin, Tomas Morosinotto, Fabrizio Bezzo</i>	
<b>(668c) Use of Unionized Ammonia to Control Zooplankton Grazers in Cultures of Scenedesmus</b> .....	1112
<i>Caleb Talbot, Blake Steiner, Siobhan McFarlane, Ben Stuart, Sandeep Kumar</i>	
<b>(668d) Extracellular Glycerol Production By Dunaliella Tertiolecta in a Membrane Photobioreactor</b> .....	1113
<i>Prashant Praveen, Clement J. Lefebvre, Kai Chee Loh</i>	
<b>(668e) Microalgal Fuels and Chemicals Production Using Kinetic Modeling and Scaled-up Experimental Studies</b> .....	1114
<i>Mesut Bekirogullari</i>	
<b>(668f) Tertiary Wastewater Treatment By Chlorella vulgaris in a Membrane Photobioreactor: Effects of Wastewater Composition and Light/Dark Cycle</b> .....	1115
<i>Prashant Praveen, Kai-Chee Loh</i>	
<b>(668g) Modeling Algal Cultivation in the United Arab Emirates</b> .....	1116
<i>Jose A. Gomez, Ahmed Al Hajaj, Paul I. Barton</i>	
<b>(675a) Kinetics of Coffee Oil Ethanolysis Catalyzed By an Immobilized Lipase Enzyme to Produce Biodiesel</b> .....	1118
<i>Enrico N. Martinez, Nathaniel Kallmyer</i>	
<b>(675b) Different Parameters Controlling the Biocrude Yield in Hydrothermal Liquefaction of Microalgae</b> .....	1119
<i>Kwonit Mallick, Feng Cheng, Shanka H. Gedara, Catherine E. Brewer, Nagamany Nirmalakhandan</i>	
<b>(675c) Synthesis and Characterization of Proto-Kerogen Via Simulated Diagenesis of Litopenaeus Setiferus and Procamburus Clarkii chitin</b> .....	1120
<i>Amber Pete</i>	
<b>(675d) The Impact of Treatment Conditions on Biomass Maturation and Conversion</b> .....	1121
<i>Dustin McCallum, Jacob R. Borden</i>	

<b>(675e) Ethanol Conversion to n-Butanol Via the Guerbet Chemistry: Role of Mixed Oxide Catalysts</b> .....	1122
<i>Karthikeyan K. Ramasamy, Michel Gray, Carlos Alvarez-Vasco</i>	
<b>(675g) Microwave-Assisted Pyrolysis of Coal-Biomass Mixtures UNDER Reactive Gases</b> .....	1123
<i>Victor Abdelsayed, Dushyant Shekhawat, Mark Smith, Michael J. Spencer, Dirk Link</i>	
<b>(677a) Carbon Dioxide Reduction and Carbon Dioxide Reuse in Advanced Biorefineries</b> .....	1124
<i>Kok Siew Ng, Jhuma Sadhukhan, Mobolaji Shemfe</i>	
<b>(677b) Hydrogen Storage and Carbon Dioxide Valorization through Reductive Calcination of Mineral Carbonates</b> .....	1125
<i>Georg Baldauf-Sommerbauer, Matthaeus Siebenhofer, Susanne Lux</i>	
<b>(677c) Carbon Dioxide Sequestration Via Zn-Catalyzed Urea Conversion to Dimethyl Carbonate</b> .....	1126
<i>Rachel Sturtz, Matthew Gattinger, Holly Kuhl, Lars Peereboom, Chandrakant B. Panchal, John C. Prindle, Dennis J. Miller</i>	
<b>(677d) The Stability Performance of Synthetic Ca-Based Sorbents Doped By Zirconium-Based Ceramics in Cyclic CO<sub>2</sub> capture Operations</b> .....	1127
<i>Amir Hassan Soleimanislim, Mohammad Hashem Sedghkerdar, Davood Karami, Nader Mahinpey</i>	
<b>(677e) Improvement of Sn Electrocatalytic Reaction for CO<sub>2</sub> Conversion into Formate</b> .....	1128
<i>Angel Irabien, Manuel Alvarez-Guerra, Andres del Castillo-Martin</i>	
<b>(677f) Innovative CO<sub>2</sub> Utilization By Carbonation Curing of Lightweight Concrete Made with Portland Limestone Cement</b> .....	1129
<i>Hilal El-Hassan, Yixin Shao</i>	
<b>(677h) Surface Behaviors of Electrodeposited Tin Oxide on Selected Substrates and Their Effectiveness in CO<sub>2</sub> Electro-Reduction</b> .....	1138
<i>Andrew McCaskill, Nikiforos Christou, Jonathan Mbah</i>	
<b>(679a) Thermochemical Characterization of Sugarcane Bagasse for the Production of Combustibles Via Pyrolysis Using N<sub>2</sub> As Carrier Gas</b> .....	1139
<i>Laura Suarez, Gerardo Gordillo</i>	
<b>(679c) The Effect of Torrefaction Pretreatment, Temperature, and Lignin Content of Hybrid Poplar on the Quality of Fast Pyrolysis Bio-Oil</b> .....	1140
<i>Bethany Klemetsrud, David R. Shonnard, Dominic Eatherton</i>	
<b>(679d) Effect of Operating Parameters on Ablative Pyrolysis of Wood</b> .....	1141
<i>Guanqun Luo, Ryan Eng, Fernando Resende</i>	
<b>(679e) A Combined Pyrolysis – Gasification Study to Increase Syngas Production Yield from Beer Bagasse Waste</b> .....	1142
<i>Rene Garrido, Isaac Diaz, Catalina Pardo, Rodrigo Barrientos, Georgina Diaz, Melanie Colet, Francisco Gracia</i>	
<b>(679f) Product Distribution and Kinetics of Hydrolysis of Agro Residues Via Py-GC/MS and Py-FT-IR</b> .....	1143
<i>Deepak Ojha, R. Vinu</i>	
<b>(685a) Techno-Economic Assessment of CO<sub>2</sub> Quality Effect on Its Storage and Transport (CO<sub>2</sub>QUEST)</b> .....	1144
<i>Haroun Mahgerefteh, Sergey Martynov, Richard Porter</i>	
<b>(685b) Understanding the Factors That Affect CO<sub>2</sub> Transport, Storage, and Enhanced Oil Recovery Potential in Unconventional Reservoirs</b> .....	1145
<i>Bethany Kurz, James A. Sorensen, Steve Hawthorne, Alexander Azenkeng, Steve Smith, Kurt Eylands, Blaise Mibeck, Volker Herdegen</i>	
<b>(685c) Evaluating the Feasibility and Scale of Geologic CO<sub>2</sub> Storage Potential in Ohio’s Appalachian Region</b> .....	1146
<i>Priya Ravi Ganesh, Autumn Haagsma, Glenn Larsen, Isis Fukai, Joel Main, Mackenzie Scharenberg, Neeraj Gupta</i>	
<b>(685d) Shallow Ground Water Monitoring at the Secarb CO<sub>2</sub> Injection Site Near Citronelle, Alabama</b> .....	1148
<i>Joseph A. Swisher, Robert Trautz, Richard Rhudy, George J. Koperna, David Riestenberg</i>	
<b>(685e) Probabilistic Analysis of CO<sub>2</sub> Storage Mechanisms in a CO<sub>2</sub>-EOR Field Using Polynomial Chaos Expansion</b> .....	1149
<i>Wei Jia, Brian McPherson, Feng Pan, Ting Xiao, Grant Bromhal</i>	
<b>(685f) Monitoring Ions Based on Reactive Transport Modeling of CO<sub>2</sub> Sequestration in Ulleung Basin, Korea</b> .....	1150
<i>Jinan Jeong</i>	
<b>(690a) The Top-Ref Approach to Improve the Resource Efficiency of Energy Intensive Industrial Processes</b> .....	1151
<i>Heiko Radatz, Torsten Hellenkamp, Gerhard Schembecker, Christian Bramsiepe</i>	
<b>(690b) Novel Data Envelopment Analysis Approach for Sustainability Assessment: Application to Electricity Generation Technologies</b> .....	1152
<i>Angel Galán-Martín, Gonzalo Guillén-Gosálbez, Laurence Stamford, Adisa Azapagic</i>	

<b>(690d) Optimal Design of Sustainable Agricultural Water Networks</b> .....	1153
<i>Jesús M. Nuñez-López, Maritza E. Cervantes-Gaxiola, Oscar M. Hernández-Calderón, Eusiel Rubio-Castro, Jose Maria Ponce-Ortega</i>	
<b>(693a) Li-Rich Anti-Perovskite Superionic Conductor Films for All-Solid-State Li-Ion Batteries</b> .....	1154
<i>Xujie Lu, Hongwu Xu, Quanxi Jia</i>	
<b>(693b) Carbon Foams from Polyhipe/Reduced Graphene Oxide Composites and Their Performance As Electrodes in Supercapacitor Devices</b> .....	1155
<i>Robert T. Woodward, Foivos Markoulidis, Derrick Fam, Tom O. McDonald, Francois De Luca, Milo S. P. Shaffer, Alexander Bismarck</i>	
<b>(693c) Designing Electrolytes for Beyond Li-Ion Batteries Using Coupled High Throughput Ab Intio Calculations and MD Simulations</b> .....	1156
<i>Nav Nidhi Rajput, Xiaohui Qu, Vijayakumar Murugesan, Kiran Mathew, Kee Sung Han, Karl Mueller, Kristin Persson</i>	
<b>(693d) The Influence of Tetrabutylammonium (TBA) Salts on the Discharge and Charge Behavior of Li-O<sub>2</sub> Batteries</b> .....	1157
<i>Chibueze Amanchukwu, Yang Shao-Horn, Paula Hammond</i>	
<b>(693e) Freestanding V<sub>2</sub>O<sub>5</sub>-PEDOT Thin Film Electrode for Rechargeable Aqueous K-Ion Energy Storage</b> .....	1158
<i>Daniel S. Charles, Xiaowei Teng</i>	
<b>(693f) Theoretical Consideration of Nanostructured Magnetite As an Electrode Material for Li-Ion Energy Storage</b> .....	1159
<i>Christianna N. Lininger, Mark S. Hybertsen, Alan C. West</i>	
<b>(693g) Highly Flexible Self-Assembled V<sub>2</sub>O<sub>5</sub> Cathodes Enabled By Conducting Diblock Copolymers</b> .....	1162
<i>Hyosung An, Jared Mike, Kendall Smith, Lisa Swank, Yen-Hao Lin, Stacy Pesek, Rafael Verduzco, Jodie Lutkenhaus</i>	
<b>(693h) Combined Experimental and Theoretical Study of Oxygen Mobility in Hydrated Alpha-MnO<sub>2</sub></b> .....	1163
<i>Zhenzhen Yang, Denise C. Ford, Joong Sun Park, Yang Ren, Hacksung Kim, Michael M. Thackeray, Maria K. Y. Chan</i>	
<b>(695a) Template Particle &amp; Solvent Evaporation Assisted Phase Inversion: Easy and Robust Control of Filtration Membrane Morphologies for Various Applications</b> .....	1164
<i>Samuel C. Hess, Xavier Kohll, Renzo A. Raso, Christoph M. Schumacher, Robert N. Grass, Wendelin J. Stark</i>	
<b>(695b) Intrinsically Microporous Polyimides Incorporating TröGer's Base (TB) for Membrane Gas Separation</b> .....	1165
<i>Jong Geun Seong, Yongbing Zhuang, Yu Seong Do, Won Hee Lee, Michael D. Guiver, Young Moo Lee</i>	
<b>(695c) Comparison of Performance Between Laboratory Scale and Industrial Scale Membranes</b> .....	1166
<i>Sneha Chede, Peter Griffiths, Nicholas Linck, Tequila Harris, Matthew Weisenberger, Isabel Escobar</i>	
<b>(695d) Interfacial Polymerization for Sugar / Ionic Liquid Separations</b> .....	1167
<i>Alexandru Avram, Pejman Ahmadiannamini, Ranil Wickramasinghe, Xianghong Qian</i>	
<b>(695e) Development of High Performance Carboxylated PIM-1/P84 Blend Membranes for Pervaporation Dehydration of Isopropanol and CO<sub>2</sub>/CH<sub>4</sub> Separation</b> .....	1168
<i>Peyman Salehian, Yong Wai Fen, Tai-Shung Chung</i>	
<b>(695f) Effects of Fabrication Conditions on the Microstructures and Performances of Smart Gating Membranes with in Situ assembled Nanogels As Gates</b> .....	1169
<i>Feng Luo, Rui Xie, Xiao-Jie Ju, Wei Wang, Zhuang Liu, Liang-Yin Chu</i>	
<b>(695g) Novel Thermally Cross-Linked Polyimide Membranes for Ethanol Dehydration Via Pervaporation</b> .....	1170
<i>Sheng Xu, Yan Wang</i>	
<b>(695h) Recent Advances in Evaporometry for Determining the Pore-Size Distribution of Membranes</b> .....	1171
<i>Ebrahim Akhondi, Farhad Zamani, William B. Krantz, Anthony G. Fane, Jia Wei Chew</i>	
<b>(710a) Inhibitory Effect of Condensed and Non-Condensed Phenolic Moieties in Lignin on Enzymatic Hydrolysis</b> .....	1172
<i>Shaolong Sun, Maobing Tu</i>	
<b>(710b) Measurement and Evaluation of Recalcitrance Changes for Organic Solvent Pretreatment Methods</b> .....	1173
<i>Thomas T. Kwok, Matthew J. Realff, Andreas S. Bommarius</i>	
<b>(710c) One Step Breaking Softwood Recalcitrance By Cellulose Solvent-Based Lignocellulose Fractionation Followed By Enzymatic Saccharification</b> .....	1174
<i>Thanh Khoa Phung, Li Kang, Christian Canlas, Scott Rennecker, Teerawit Prasomsri, Noppadon Sathitsuksanoh</i>	
<b>(710d) A Novel Acid Catalyst for Conversion of Ethanol to Butanol</b> .....	1175
<i>Bin Wang, Yueli Wen, Maohong Fan</i>	
<b>(712a) High Temperature Solar Thermochemical Energy Storage Materials</b> .....	1176
<i>James F. Klausner</i>	



<b>(712b) Techno-Economic Assessment of the Polygeneration of Liquid Fuels and Electricity By Solar Hybridised Gasification of Coal</b> .....	1177
<i>Woei Saw, Ashok A Kaniyal, Philip van Eyk, Jim Hinkley, Graham J. Nathan, Peter J Ashman</i>	
<b>(712c) Solar Metallothermic Production of Rare Earth Elements</b> .....	1178
<i>Peter Kreider, Maria Salazar, Mahesh Venkataraman, Wojciech Lipinski</i>	
<b>(712e) Manganese As a Redox Reactant for Sustainable Thermochemical Ammonia Synthesis</b> .....	1179
<i>Michael G. Heidlage, Peter H. Pfromm</i>	
<b>(719a) Highly Selective Fischer-Tropsch Synthesis for Production of JP-8 Jet Fuel from Coal and Coal/Biomass Mixtures</b> .....	1180
<i>Andrew Lucero, Brittany Koob, Brandon Cline, Kevin McCabe, Santosh Gangwal</i>	
<b>(719b) Composition of Bio-Crude Oils from Hydrothermal Liquefaction of Algae in Batch Reactor</b> .....	1181
<i>Zheng Cui, Feng Cheng, Travis Le-Doux, Kwonit Mallick, Carolina Herrera, Graham Hoffman, Jacqueline Jarvis, Neil Paz, Tanner Schaub, Nagamany Nirmalakhandan, Catherine E. Brewer</i>	
<b>(719c) De-Alloyed Platinum-Bismuth Nanoparticles As Highly Active Electrocatalysts for Dimethyl Ether Oxidation and Oxygen Reduction</b> .....	1182
<i>Anastasios Angelopoulos, Punit Boolchand, Zhipeng Nan</i>	
<b>(719d) Co-Production of Methanol and Dimethyl Ether Using a Modified Copper-Based Catalyst System</b> .....	1183
<i>Lujie Ye</i>	
<b>(719e) Design of a Sabatier Reactor for CO<sub>2</sub> Conversion into Synthetic Methane</b> .....	1186
<i>Duo Sun, David Simakov</i>	
<b>(719g) Steam Reforming of Dimethyl Ether over a Novel Plate-Type <math>\gamma</math>-Al<sub>2</sub>O<sub>3</sub>/Al Monolith Supported Cu-Based Bi-Functional Catalyst</b> .....	1187
<i>Feiyue Fan, Qi Zhang, Zibin Zhu</i>	
<b>(723a) Computational Modeling of Electrochemical Bio-Oil Upgrading</b> .....	1188
<i>David C. Cantu, Yeohoon Yoon, Manh-Thuong Nguyen, Yanggang Wang, Asanga B Padmaperuma, Michael A. Lilga, Vassiliki-Alexandra Glezakou, Roger Rousseau</i>	
<b>(723b) Optimizing Catalytic Fast Pyrolysis and Hydrotreating for the Production of Biofuels</b> .....	1189
<i>Kristina Iisa, Richard French, Kellene Orton</i>	
<b>(723c) In Situ Raman Analysis for the Production of Biofuel Using a Heterogeneous Layered Double Hydroxide Catalyst</b> .....	1190
<i>Obakore Agbroko, Keyvan Mollaieian, William E Holmes, Tracy J. Benson</i>	
<b>(723d) Hydroprocessing of Biocrude into Hydrocarbon Liquid Fuel</b> .....	1191
<i>Ofei D. Mante, David Dayton, David Barbee, Kaige Wang, James Shumaker</i>	
<b>(723e) Hydrodeoxygenation and Hydroisomerization of Algae Oils to Hydrocarbon Fuels</b> .....	1192
<i>Jacob S. Kruger, Earl Christensen, Tao Dong, Robert McCormick, Philip Pienkos</i>	
<b>(723f) Continuous Hydrodeoxygenation of Liquid Phase Pyrolysis Oil</b> .....	1193
<i>Nikolaus Schwaiger, Andrea Rollett, Michael Schadler, Thomas Pichler, Juergen Ritzberger, Klara Treusch, Klaus Schlackl, Roland Nagl, Manuel Menapace, Peter Pucher, Matthaeus Siebenhofer, Anna Mauerhofer</i>	
<b>(724a) Developing a Simulation Framework for Optimizing CO<sub>2</sub>-Capture Processes</b> .....	1194
<i>Stuart Higgins, Y.a. Liu</i>	
<b>(724b) The Development and Demonstration of Best-Practice Guidelines for the Start-up Injection of CO<sub>2</sub> into Highly-Depleted Gas Fields</b> .....	1195
<i>Andrea Sacconi, Haroun Mahgerefteh, Sergey Martynov, Solomon F. Brown</i>	
<b>(724c) Application of a Systematic Methodology for Sustainable Carbon Dioxide Utilization Process Design</b> .....	1196
<i>Cristina Calvera Plaza, Rebecca Frauzem, Rafiqul Gani</i>	
<b>(724d) Dynamic Modeling and Simulation of the Carbon Capture System Using Blended Amine-Based Solvent</b> .....	1197
<i>Dasom Im, Sun Hyung Kim, Jay H. Lee</i>	
<b>(724e) Continuous-Time Model for Retrofitting of Power Plants and Optimal Carbon-Capture and Storage</b> .....	1198
<i>Amit Kumar, Munawar A. Shaik</i>	
<b>(724f) Heat Integration of Absorption-Based Carbon Capture Processes in the Industrial Sector</b> .....	1199
<i>Viktor Andersson, Thore Berntsson, Per-Åke Franck</i>	
<b>(724g) Study of Mass Transfer and Sorption Phenomena in CO<sub>2</sub>/Brine/Rock Systems</b> .....	1200
<i>Zhuofan Shi, Kristian Jessen, Theodore Tsotsis</i>	
<b>(724h) Numerical Modeling of CO<sub>2</sub> Sequestration in Deep, Saline, Dolomitic-Limestone Aquifers</b> .....	1201
<i>Ram Kumar, Scott W. Campbell, Jeffrey Cunningham</i>	
<b>(729a) Effects of Recycling Regenerated Heat Carrier on the Performance of an Auger Pyrolysis Reactor</b> .....	1202
<i>Tannon J. Daugaard, Mark Mba Wright</i>	

<b>(729b) Pyrolysis of Biomass Using Blast Furnace Slag As Catalyst.....</b>	1203
<i>Foster Agblevor, Ville Paasikallio</i>	
<b>(729c) Recycling of Used Railroad Ties Via a Thermochemical Process Using a Semi-Pilot Scale Auger Reactor System .....</b>	1204
<i>Pyoungchung Kim, Nicole Labbé, Nourredine Aboulmoumine, Jae-Woo Kim, Jeff Lloyd</i>	
<b>(729d) Effect of Feedstock Formatting on Gasification Performance for Hybrid Poplar, Corn Stover and Low-Quality Materials.....</b>	1205
<i>John E. Aston, Peter Kong</i>	
<b>(729e) Effects of Catalyst Properties on Biomass Conversion By Catalytic Fast Pyrolysis and Hydropyrolysis.....</b>	1206
<i>David P. Gamliel, Julia A. Valla</i>	
<b>(729f) Effects of Feedstock on the Product Yields and Selectivity of Lignocellulosic Biomass Pyrolysis Using HZSM-5 Catalyst .....</b>	1209
<i>Justinus A. Satrio, Charles G. Coe, Brendon Shea</i>	
<b>(731a) Physiochemical Characterization of Lignocellulosic Biomass Dissolution By Flowthrough Pretreatment .....</b>	1210
<i>Bin Yang, Libing Zhang, Yunqiao Pu, Art Regauskas, John R Cort</i>	
<b>(731b) Comparison of Ethanol Yields from Fermentation of Hydrolysates Produced By CO-Solvent Enhanced Lignocellulosic Fractionation (CELF) and Dilute Acid Pretreatments of Switchgrass .....</b>	1211
<i>Abhishek Patri, Charles M. Cai, Rajeev Kumar, Charles Wyman</i>	
<b>(731c) Understanding the Effects of Ammonia and Organosolv Pretreatments on Physicochemical Characteristics of Lignin.....</b>	1212
<i>Chang Geun Yoo, Mi Li, Yunqiao Pu, Arthur J. Ragauskas</i>	
<b>(731d) How Solvent Properties Determine Pretreatment Effects on Key Lignocellulosic Characteristics .....</b>	1213
<i>Thomas T. Kwok, Matthew J. Realf, Andreas S. Bommarius</i>	
<b>(731e) Comparison of Celf, Cu-AHP, and HS Ionic Liquid Pretreatment of Hardwoods: Hydrolysis Yields, Comprehensive Mass Balances, and Lignin Properties .....</b>	1214
<i>Aditya Bhalla, Charles M. Cai, Feng Xu, Rajeev Kumar, Blake Simmons, Seema Singh, Charles Wyman, Eric Hegg, David Hodge</i>	
<b>(731f) Understanding the Influence of Hemicellulose and Lignin Removal on Deconstruction of Switchgrass By Clostridium Thermocellum Consolidated Bioprocessing Vs. Conventional Fungal Enzymatic Hydrolysis.....</b>	1215
<i>Ninad D. Kothari, Charles M. Cai, Rajeev Kumar, Charles E. Wyman</i>	
<b>(748a) Separation of Lignin from Organosolv Spent Liquor- from Phase Behavior to Continuous Processing.....</b>	1216
<i>Peter Schulze, Andreas Seidel-Morgenstern, Heike Lorenz</i>	
<b>(748b) Cell Lysis and Lipid Recovery from Oleaginous Yeast.....</b>	1217
<i>Jacob S. Kruger, Nicholas Cleveland, Tao Dong, Mary Bidy, Gregg T. Beckham</i>	
<b>(748c) Transport and Reaction Modeling of Biomass Pretreatment and Topochemical Evolution Using Actual 3D Structure of Plant Cell Walls .....</b>	1218
<i>Shri Ramaswamy, Sahana Ramanna, Bandaru V. Ramarao</i>	
<b>(748d) Lignin-Derived Products from Biocrude As Building Block Chemicals .....</b>	1219
<i>Ofei D. Mante, David Dayton, Mustapha Soukri</i>	
<b>(748e) Continuous Butanol Extraction Using Supercritical Carbon Dioxide .....</b>	1220
<i>Michael T. Timko, Kristala L. Jones Prather, Janelle Thompson</i>	
<b>(748f) Development of an Integrated Aquaculture System for Clean Water and Animal Feed Production.....</b>	1221
<i>Tanner Barnharst, Aravindan Rajendran, Cristiano Reis, Yanmei Zhang, Jing Gan, Yuchuan Wang, Yu Cao, Bo Hu, Xin Zhang</i>	
<b>(748g) Carbon Dioxide (CO2) Capture and Utilization Pathways – Assessing the Synergies Between Biological Use and Geological Sequestration of CO2.....</b>	1222
<i>Sudhanya Banerjee, Shri Ramaswamy</i>	
<b>(751a) Sustainable Development and Footprint Optimization in Shale Development .....</b>	1223
<i>Janet Peargin, Hong Jin</i>	
<b>(751c) Green Net Value Added As a Sustainability Metric Based on Life Cycle Assessment: An Application to Bounty® Paper Towel .....</b>	1230
<i>Bayou Demeke, Wesley Ingwersen, Annie Weisbrod, Manuel Ceja, Bernhard Weber</i>	
<b>(751d) Sustainability Metrics for Solar Powered Charging Infrastructure for Electric Vehicles.....</b>	1231
<i>Jennifer L. Anthony, Larry Erickson, John R. Schlup</i>	

<b>(751f) Evaluation of Low-Energy Recovery of N-Methyl-2-Pyrrolidone Solvent from Waste Streams in Specialty Resin Manufacture.....</b>	1232
<i>C. Stewart Slater, Mariano J. Savelski, Paul Tozzi, Christian Wisniewski, Nicholas Zalewski, Frank Richetti</i>	
<b>(751g) Thermoelectric Power Technology Choices Based on Water Availability .....</b>	1233
<i>Erik Shuster, Dale Keairns</i>	
<b>(752a) Deciphering Lignin Deconstruction Mechanism of Lower Termite.....</b>	1234
<i>Shulin Chen</i>	
<b>(752b) Production of Food, Energy, and Fuel from Microalgae in Holographic Diffractive Optic-Solar Glass Reactors.....</b>	1235
<i>Kimberly Ogden, Lloyd Lacombe, Paul Nakazato</i>	
<b>(752c) Butanol Production by Clostridium Acetobutylicum in a Series of Packed Bed Biofilm Reactors .....</b>	1236
<i>Francesca Raganati, Alessandra Procentese, Giuseppe Olivieri, Maria Elena Russo, Peter Gotz, Piero Salatino, Antonio Marzocchella</i>	
<b>(752d) Effect of Environmental Factors Towards Patchoulol Production By Chlamydomonas Reinhardtii .....</b>	1243
<i>Irina Harun, Klaus Hellgardt</i>	
<b>(752e) Nutrient Capture By a Sustainable Symbiotic Biofilm: Simultaneous Phosphorous and Nitrogen Recovery By Attached Fungi and Microalgae Biofilm .....</b>	1244
<i>Aravindan Rajendran, Bo Hu, Tanner Barnharst, Bruno Hespagnol, Cristiano Reis, Yanmei Zhang, Carlos Zamalloa, Xin Zhang, Hongjian Lin, Jing Gan, Yuchuan Wang</i>	
<b>(752f) Incorporating Hydrodynamics into Spatiotemporal Metabolic Models of Bubble Column Gas Fermentation.....</b>	1245
<i>Jin Chen, Xiangang Li, Derek Griffin, Xueliang Li, Michael A. Henson</i>	
<b>(752g) A Commercial Demonstration of Biorefinery of Lipids--Coproduct of Biodiesel and 1,3-Propanediol .....</b>	1246
<i>Dehua Liu, Wei Du, Xuebing Zhao, Hongjuan Liu, Keke Cheng, Zhen Chen</i>	
<b>(753b) Experimentally Driven Choices in the Fabrication of a 45 Kw Solar Simulator .....</b>	1247
<i>Scott C. Rowe, W Ray Cravey, Allan Lewandowski, Illias Hischer, Richard Fisher, David E. Clough, Alan W. Weimer</i>	
<b>(753c) Carbon Nanotube (CNT) Based Multifunctional Optoelectronic Rods for Efficient Energy Generation and Transport.....</b>	1248
<i>M. Jasim Uddin, Glenn Grissom, H. Justin Moore</i>	
<b>(753d) Thermal Ageing Characterization of Materials Under Concentrated Solar Power .....</b>	1257
<i>Konstantinos E. Kakosimos, Jawad Sarwar, Tarek Shrouf</i>	
<b>(753e) Development and Thermal Test Results of a 10 Kw Porous Media Solar Reactor.....</b>	1258
<i>Carlos E. Arreola-Ramos, Camilo A. Arancibia-Bulnes, Heidi I. Villafan-Vidales, Juan O. Del Valle, Fernando U. Morales-López, Hernando Romero-Paredes</i>	
<b>(753f) Thermal Model of a Solar Porous Media Receiver for a Thermochemical Reactor .....</b>	1259
<i>Carlos E. Arreola-Ramos, Carlos E. De Mendoza, Heidi I. Villafan-Vidales, Moises Montiel-Gonzalez, Patricio J. Valades-Pelayo, Camilo A. Arancibia-Bulnes</i>	
<b>(753g) Effect of Dust on Straight Tube Receiver of a Parabolic Trough Concentrator.....</b>	1260
<i>Shailendra K. Shukla, Arun Kumar, Shweta Kumari</i>	
<b>(758a) Renewable Transportation Fuel Production from Algal Biocrude Oil Converted Via Hydrothermal Liquefaction .....</b>	1261
<i>Zhenwei Wu, Wan-Ting Chen, Yuanhui Zhang</i>	
<b>(758b) Biochemicals Production By Genetically Engineered Cyanobacteria Using Photobioreactors.....</b>	1262
<i>Jun-ichi Horiuchi, Taizo Hanai, Akio Murakami, Yasutaka Hirokawa, Yoichi Kumada</i>	
<b>(758c) Kinetic Modelling of Microalgae Growth for the Optimization of Starch and Lipid Production .....</b>	1263
<i>Gonzalo M. Figueroa-Torres</i>	
<b>(758d) Enhanced Biomass and Lipid Productivities of Outdoor Alkaliphilic Microalgae Cultures through Increased Media Alkalinity .....</b>	1264
<i>Agasteswar Vadlamani, Brahmaiah Pendyala, Mohammadmatin Hanifzadeh, Sridhar Viamajala, Sasidhar Varanasi</i>	
<b>(758e) Macroemulsion Mixture Assisted Organic Solvent Extraction of Algal Lipids from Unconcentrated Algal Culture.....</b>	1265
<i>Chen Zhang, Bernhard Vogler, Yu Lei, James Smith</i>	
<b>(758f) An Ecological and Engineering Approach to Optimizing Algal Biofuels.....</b>	1266
<i>David Carruthers, Chang Kyu Byun, Bradley J. Cardinale, Xiaoxia (Nina) Lin</i>	
<b>(764a) Current Status and Prospects of Industrial Xylitol Production in China .....</b>	1267
<i>Lirong Yang, Mianbin Wu, Jianping Lin, Buli Su</i>	
<b>(764b) Rational Substitution of Firefly Luciferase from Photinus Pyralis for Improvement of Thermostability.....</b>	1268
<i>Meng Si, Qing Xu, Ling Jiang, He Huang</i>	

<b>(764c) Improving Cellular Robustness and Butanol Titters of Clostridium Acetobutylicum ATCC824 By Introducing the Heat Shock Proteins from Extremophilic Bacteria</b> .....	1269
<i>Zhengping Liao, Jufang Wang</i>	
<b>(764d) Polymalic Acid Fermentation: A Platform for Production of Biopolymers and Chemicals</b> .....	1270
<i>Xiang Zou</i>	
<b>(764e) Engineering Yeast with Minicellulosome and Cellodextrin Pathway for Co-Utilization of Cellulose and Mixed Sugars</b> .....	1271
<i>Li-Hai Fan</i>	
<b>(764f) Integrated Chemical and Bio-Catalysis for Production of High-Value Liquid Transportation Fuels from Agricultural Residues</b> .....	1272
<i>Chuang Xue</i>	
<b>(764g) Cholesteryl Hyaluronic Acid-Coated, Reduced Graphene Oxideneanosheets for Anti-Cancer Drug Delivery</b> .....	1273
<i>Wenjun Miao</i>	
<b>(771a) Featured: Energy Conversion Considerations in Solar-Driven Photoelectrochemical Water Splitting and Carbon Dioxide Reduction</b> .....	1274
<i>Joel W. Ager</i>	
<b>(771b) An Enabling Start-up Support System for CO<sub>2</sub> Utilisation: A Case Study on Barriers to Commercial Success</b> .....	1275
<i>Marvin Kant, Arno Zimmermann, Jan Kratzer, Jochen Norwig</i>	
<b>(771d) Catalytic Dry Methane Reforming for Industrial CO<sub>2</sub> Capture Applications &amp; Syngas Generation</b> .....	1276
<i>Debanjan Chakrabarti, Nirlipt Mahapatra, Prashant Kumar, Vinay Prasad</i>	
<b>(771e) CO<sub>2</sub> As a “Soft” Oxidant for Syngas Production Via Chemical Looping</b> .....	1278
<i>Amey More, Saurabh Bhavsar, Charles Hansen, Götz Vesper</i>	
<b>(771f) Process and Material Design for Micro-Encapsulated Ionic Liquids in Post-Combustion CO<sub>2</sub> Capture</b> .....	1279
<i>Bo Hong, Mark J. McCready, Joan F. Brennecke, Mark A. Stadtherr</i>	
<b>(771g) Material Development and Assessment of a Thermochemical Energy Storage Based on CaO/CaCO<sub>3</sub></b> .....	1280
<i>Jonas Obermeier, Kyriaki Sakellariou, Karsten Müller, George Karagiannakis, Athanasios Stubos, Wolfgang Arlt</i>	
<b>(772a) Development of a Thermoreversible Medium to Culture and Efficiently Harvest Microalgae</b> .....	1281
<i>Bendy Estime, Dacheng Ren, Radhakrishna Sureshkumar</i>	
<b>(772b) Bioprocessing Strategies for Engineered Coproduction of Biofuels and Medical Biopolymers from Diatom Microalgae</b> .....	1282
<i>Greg Rorrer, Altan Ozkan, Omar Chiriboga, J. Antonio Torres, Bettye Maddux, Christine Kelly</i>	
<b>(772c) Effects of Microalgal Polycultures on Quality of Biomass for Biocrude Oil Production Via Hydrothermal Liquefaction</b> .....	1283
<i>David C. Hietala, Cristina K. Koss, Anita Narwani, Aubrey Lashaway, Bradley J. Cardinale, Phillip E. Savage</i>	
<b>(772d) Enhanced Autotrophic Growth of Nannochloris Sp. with Buffer Chemicals for Sustainable Carbon Recycle</b> .....	1284
<i>Jinsoo Kim, Joo-Youp Lee</i>	
<b>(772e) Effect of Process Parameters and Extractive Solvents on Hydrothermal Liquefaction of Microalgae</b> .....	1285
<i>Kodanda Phani Raj Dandamudi, Tapaswy Muppaneni, Melvin Mathew, Peter Lammers, Shuguang Deng</i>	
<b>(772f) Re-Use of Hydrothermal Liquefaction Bio-Char to Grow Galdieria Sulphuraria</b> .....	1286
<i>Melvin Mathew, Thinesh Selvaratnam, Tapaswy Muppaneni, Kodanda Phani Raj Dandamudi, Peter Lammers, Shuguang Deng</i>	
<b>(773a) Engineering an Environmentally-Isolated Bacterium for Continuous Biofuel Production and Recovery Under Supercritical CO<sub>2</sub></b> .....	1287
<i>Jason T. Boock, Adam J. E. Freedman, Geoffrey Tompsett, Michael T. Timko, Janelle R. Thompson, Kristala L.J. Prather</i>	
<b>(773b) A Whole-Plant Genome-Scale Model of Maize</b> .....	1288
<i>Margaret N. Simons, Bertrand Hirel, Costas D. Maranas</i>	
<b>(773c) Plants 2.0: Towards Metabolic Engineering of Natural Product Biosynthesis into Crops</b> .....	1289
<i>Amy Calgaro, Andrew P. Klein, Elizabeth Sattely</i>	
<b>(773d) Metabolic Model of Trichodesmium Erythraeum, a Marine Diazotroph</b> .....	1290
<i>Joseph Gardner, Nanette R. Boyle</i>	
<b>(773e) Developing a Tunable and Tightly Controlled Gene Expression System in Synechocystis sp. PCC6803</b> .....	1291
<i>Rajib Saha, Bertram M. Berla, Himadri B Pakrasi</i>	

<b>(773f) A Strain Engineering Strategy for the Containment of Genetically Modified Cyanobacteria</b> .....	1292
<i>Ryan L. Clark, Thatcher W. Root, Brian F. Pfleger</i>	
<b>(783a) Numeric Optimization of Power Consumption for Simultaneous Saccharification and Fermentation of Cellulose to Ethanol</b> .....	1293
<i>Leonard Becker, Thomas Eppinger, Ravindra Aglave</i>	
<b>(783b) Furfural Production By Continuous Reactive Extraction</b> .....	1294
<i>Myrto Papaioannou, Roel Kleijwegt, Jaap C. Schouten, John van der Schaaf</i>	
<b>(783c) An Investigation of the Degradation of Lignin in Sub-Super Critical Water in a Continuous Flow Reactor</b> .....	1297
<i>Sara Pourjafar, Wayne S. Seames, Brian Tande, Jasmine Kreft, Alena Kubatova</i>	
<b>(783d) Interaction Between Model Compounds in Lignocellulosic Biomass Under Supercritical Water Conditions</b> .....	1298
<i>Nattacha Paksung, Yukihiko Matsumura</i>	
<b>(783e) A Novel Single Microsphere-Microreactor Approach Modeling and Experimental for Study of Biomass Fast Pyrolysis</b> .....	1299
<i>Ali Zolghadr, Clark Templeton, Joseph Biernacki</i>	
<b>(783f) Computational Fluid Dynamics Study of Full-Scale Aerobic Bioreactors: Evaluation of Dynamic Oxygen Distribution, Gas-Liquid Mass Transfer, and Reaction</b> .....	1300
<i>David Humbird, Hariswaran Sitaraman, Jonathan J. Stickel, Michael A. Sprague, James D. McMillan</i>	
<b>Author Index</b>	