

International Congress on Energy 2018

Core Programming Area at the 2018 AIChE Annual Meeting

Pittsburgh, Pennsylvania, USA
28 October - 2 November 2018

ISBN: 978-1-5108-7608-8

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© (2018) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2019)

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

Additional copies of this publication are available from:

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

TABLE OF CONTENTS

(79a) Experimental and Theoretical Studies of the Electrochemical Reduction of CO₂ on Cu.....	1
<i>Alexis T. Bell</i>	
(79b) Highly Efficient CO Electroreduction Catalyst Based on Polycrystalline Cu Particles.....	2
<i>Jing Li, Qi Lu</i>	
(79c) Operando Spectroscopic Investigations of Oxide Derived Metal Catalysts for CO₂ and CO Reduction.....	3
<i>Arnav Malkani, Marco Dunwell, Bingjun Xu</i>	
(79d) Molecular-Level Insights into Electrocatalytic Carbon Dioxide Reduction at Cobalt Macrocycles.....	4
<i>Karthish Manthiram</i>	
(79e) Mass Transfer Effects in CO₂ Reduction Electrocatalysis	5
<i>Chao Wang</i>	
(79f) Single Atom Catalysts for Electrochemical Reduction of CO₂.....	6
<i>Aditya Prajapati, Songwei Che, Vikas Berry, Meenesh R. Singh</i>	
(79g) Photoelectrochemical CO₂ Reduction at Plasmonic Nanostructured Silver Electrodes.....	7
<i>Elizabeth R. Corson, Erin B. Creel, Youngsang Kim, Matthew J. Liu, Davis D. Perez, Jeffrey J. Urban, Robert Kostecki, Bryan D. McCloskey</i>	
(120b) 2018 Outlook for Energy: A View to 2040	8
<i>Theodore J. Wojnar Jr.</i>	
(120c) Energy Decarbonisation Scenarios	9
<i>Kamel Ben Naceur</i>	
(120a) Fundamental Research Needs to Advance Energy Technologies	10
<i>Bruce Garrett</i>	
(144a) Solid-State Depolymerization and Isolation of Lignin from Lignocellulosic Biomass.....	11
<i>Ning Li, Yanding Li, Chang Geun Yoo, Xiaohui Yang, Xuliang Lin, John Ralph, Xuejun Pan</i>	
(144b) Catalytic Depolymerization and Liquefaction of Lignin in Ionic Liquid By SO₄²⁻/ZrO₂ in a Flow through System	12
<i>Xiuwei Wang, Eika W Qian</i>	
(144c) The Impact of Acid Site Concentration and Pore Diameter on the Cracking of Lignin Derived Monomers in Zeolites	13
<i>Michael Stellato, Carsten Sievers, Andreas S. Bommarius</i>	
(144d) High Energy Density Fuels Produced from Lignin-Derived Intermediates and Refinery Waste Gas Streams	14
<i>Maoqi Feng, Bin Yang</i>	
(144e) Towards Valorization of Biorefinery Waste to Polyhydroxyalkanoate: Structural Characterization and Mechanisms.....	15
<i>Naijia Hao, Somnath Shinde, Zhihua Liu, Joshua Yuan, Arthur J. Ragauskas</i>	
(144f) Characterization of Deep Eutectic Solvent Extracted Lignin Streams from Endocarp Biomass.....	16
<i>Wenqi Li, Kirtley Amos, Mi Li, Yunqiao Pu, Arthur J. Ragauskas, Seth Debolt, Yang-Tse Cheng, Jian Shi</i>	
(144h) Reactivity-Based Fractionation of Lignins Via Reversible Conjunction to Polymeric Amines.....	17
<i>Zhenglun Li</i>	
(144i) Understanding and Modeling Effects of Nitrogen Source on Biosynthesis of Polyhydroxyalkanoates from Benzoate By Pseudomonas Putida KT2440	18
<i>Zhangyang Xu, Bin Yang</i>	
(145a) Electrochemical CO₂ Conversion to Valuable Chemicals.....	19
<i>Feng Jiao</i>	
(83h) Development of Devices and Selective Catalysts for the Solar-Driven Reduction of CO₂ to Fuels	20
<i>Marcel Schreier, Michael Gratzel, Yogesh Surendranath</i>	
(145c) Bimetallic Nanoporous Pd Alloys as CO Tolerant Electrocatalysts for the Electrohydrogenation of CO₂ to Formate.....	21
<i>Swarnendu Chatterjee, Yawei Li, Joshua Snyder</i>	
(145d) Electrochemical Promotion of Catalysis: Non-Faradaic Effects of Applied Potential on CO₂ Hydrogenation and Ethylene Oxidation Reactions	22
<i>Mark Sullivan, Dimitris Zagoraios, Constantinos Vayenas, Yuriy Roman-Leshkov</i>	
(145e) Nano- to Macro Scale Morphological Impacts on CO₂ electroreduction Product Selectivity over Cu Catalysts	23
<i>Samaneh Sharifi Golru, Alexandros N. Karaiskakis, Elizabeth J. Biddinger</i>	

(145f) Insights into the Electrocatalytic Conversion of CO₂ into CO, Ethylene, and Ethanol in Alkaline Media.....	24
<i>Paul J. A. Kenis, Andrew A. Gewirth</i>	
(145g) Insights on the Electrochemical Reduction of Carbon Dioxide Using Solid Oxide Electrolysis Cells	25
<i>Juliana S. A. Carneiro, Xiang-Kui Gu, Eranda Nikolla</i>	
(174a) Revisiting Efficiency Limits of Solar Thermochemical Fuel Production By Non-Stoichiometric Ceria-Based Redox Cycling	26
<i>Sha Li, Vincent Wheeler, Peter Kreider, Wojciech Lipinski</i>	
(174b) Experimental Framework for Evaluation of the Thermodynamic and Kinetic Parameters of Metal-Oxides for Solar Thermochemical Fuel Production	27
<i>Richard Carillo, Jonathan R. Scheife</i>	
(174c) The Effects of the Paired Charge Compensating Dopant Identity in Ceria for Solar Thermochemical H₂O and CO₂ Splitting.....	28
<i>Srashtasrita Das, Christopher L. Muhich</i>	
(174d) Computationally Accelerated Discovery and Experimental Demonstration of Materials for Solar Thermochemical Hydrogen Production.....	29
<i>Samantha L. Millican, Iryna Androshchuk, Charles B. Musgrave, Alan W. Weimer</i>	
(174e) Examining the Solar-to-Fuel Efficiency of Ceria and Perovskite Thermochemical Redox Cycles for Splitting H₂O and CO₂	30
<i>Christopher L. Muhich, Marie Hoes, Samuel Blaser, Aldo Steinfeld</i>	
(174f) Concentrated-Light Aging Techniques for High-Temperature and Solar-Energy Materials: Preliminary Results	31
<i>Konstantinos E. Kakosimos, Mohammed Al-Hashimi, Bassam Khalil, Jawad Sarwar</i>	
(174g) Nano-Structured Ceramic ALD Coatings to Stabilize SiC Against Oxidation in High Temperature Steam Solar Thermal Water Splitting Applications.....	34
<i>Amanda Hoskins, Tyler Gossett, Charles B. Musgrave, Alan W. Weimer</i>	
(217a) Integrating Non-Precious Metal H₂ Evolution Catalysts into Water Electrolyzers and Photoelectrochemical Water-Splitting Devices	35
<i>Thomas F. Jaramillo</i>	
(217b) When Electrocatalysis Matters and When It Does Not: Unexpected Observations in Water Electrolysis and Flow Battery Energy Storage.....	36
<i>James R. McKone</i>	
(217c) Understanding the Role of Adsorbed Hydroxide in Reversible Hydrogen Reactions	37
<i>Saad Intikhab, Joshua Snyder, Maureen H. Tang</i>	
(217d) Electrocatalysis at Buried Interfaces.....	38
<i>Daniel Esposito</i>	
(217e) Density-Functional-Theory Studies of Face-Centered-Cubic Tungsten Carbide and Pt Core-Shell Nanoparticles Catalysts for the Hydrogen Evolution Reaction	39
<i>Akash Jain, Ashwin Ramasubramanian</i>	
(217f) Kinetic Investigation of Nickel-Iron Layered Double Hydroxide for Hydrogen Evolution in an Alkaline Electrolyte	40
<i>Aisha Alabaid, Chunsheng Wang, Raymond A. Adomaitis</i>	
(217g) BiVO₄/WO₃ Photoanodes for Chloride Oxidation with Simultaneous H₂ Production	41
<i>Alan Rassoolkhani, Wei Cheng, Austin McKee, Jonathan Koonce, Abdulsattar Alsaedi, Syed Mubeen</i>	
(217h) On the Combustion Synthesis and Characterization of Ga_xZn_{1-x}O_yN_{1-y} for Water Splitting Applications.....	42
<i>Austin Kennedy, Ben Meekins</i>	
(243a) Theoretical and Experimental Investigation of Effective Solar Mixed Reforming for a Less Carbon Intensive Production of Methanol	43
<i>Henrik Von Storch, Patrick Hilger, Carlos Rendon, Zahra Mahdi, Nicolas Overbeck, Lamark De Oliveira, Christian Sattler, Martin Roeb</i>	
(243b) Integrated Solar-Thermochemical Reactor/Gas Recuperator for Upgrading Light Hydrocarbons	44
<i>Lucas Freiberg, Fuqiong Lei, Matthew Coblyn, Nick Auyeung, Goran N. Jovanovic, Alexandre Yokochi</i>	
(243c) Solar Thermochemical Hydrogen/Syngas Production from Methane and/or Biogas in the Presence of Non-stoichiometric Solid Oxide Carriers	45
<i>Elena Galvez, Patrick Da Costa, Romain Guibert</i>	
(243d) Dynamic Performance of Fischer-Tropsch Liquid Fuel Production from Solar-Assisted Supercritical Water Gasification of Algae.....	46
<i>Alireza Rahbari, Ali Shirazi, Mahesh Venkataraman, John Pye</i>	

(243e) Solar Thermal Ethane Cracking	47
<i>Fuqiong Lei, Yige Wang, Lucas Freiberg, Ian Reddick, Alexandre Yokochi, Goran Jovanovic, Nick Auyeung</i>	
(243f) Scope of Zero-carbon Metal Production: State-of-the-art and Future Prospects	48
<i>Mahesh Venkataraman, Alireza Rahbari, Wojciech Lipinski, John Pye</i>	
(243g) Green Steam Initiative: Novel and Cost Effective Parabolic Trough Collector System.....	49
<i>Deepankar Biswas, Vishwanath Dalvi, Sudhir V. Panse, Suresh P. Deshmukh, Jyeshtharaj B. Joshi</i>	
(243h) Stochastic Optimization to Reduce Cost of Energy for Parabolic Trough Solar Power Plant for Different Weather Conditions	57
<i>Adarsh Vaderobli, Urmila M. Divatekar</i>	
(280a) Stability of Platinum in the Electrochemical Environment: Reconstruction, Roughening, and the Third Peak	58
<i>Ian T. McCrum, Michael A. Hickner, Michael J. Janik, Marc T. M. Koper</i>	
(280b) Sustainable Synthesis of Electrocatalytic Bismuth-Based Core-Shell and De-Alloyed Nanoparticles	59
<i>Anastasios Angelopoulos, Kevin Tonnis, Junchuan Fang</i>	
(280c) Atomically Dispersed and Nitrogen Coordinated Metal Site Catalysts for Oxygen Reduction in Acids	60
<i>Gang Wu</i>	
(280d) Oxygen Reduction Reaction over a Novel 3D Pt-Supported Vertically Aligned Carbon Nanofiber.....	61
<i>Jiayi Xu, Ayyappan Elangovan, Jun Li, Bin Liu</i>	
(280e) PdCu Alloy Nanoparticles As Highly Active Electrocatalysts for Hydrogen Oxidation in Alkaline Electrolyte	62
<i>Yang Qiu, Le Xin, Yawei Li, Ian T. McCrum, Michael Janik, Wenzhen Li</i>	
(280f) Recent Developments in Electrochemical Synthesis of Hydrogen Peroxide	63
<i>Samira Siahrostami</i>	
(311a) The Impact of Shale Gas and Oil on the Chemical Industry	64
<i>Jeffrey J. Siirola</i>	
(311b) Sustainable Energy and Chemicals: Past, Present, and Future	65
<i>Joseph B. Powell</i>	
(311c) Disruptions: What the Future May Hold	66
<i>Scott F. Mitchell</i>	
(311d) Geopolitical Factors Influencing the Evolution of the Chemical Industry.....	67
<i>David West</i>	
(311e) Agility & Resilience: How to Maintain Career Competitiveness in the Changing Chemical Industry	68
<i>Antonis Papadourakis</i>	
(334b) Metal-Modified Transition Metal Nitride Electrocatalysts for Oer, HER, and Other Reactions	69
<i>Brian M. Tackett, Jingguang G. Chen, Qian Zhang</i>	
(334c) Combining Electrochemistry and Surface Science to Identify Electrocatalytic Structure-Property Relationships	70
<i>Douglas R. Kauffman, Xingyi Deng, Dominic Alfonso, Junseok Lee, Dan C. Sorescu, Christopher Matranga</i>	
(334d) Active Structures and Species of Modified Oxide Catalysts for the Oxygen Evolution Reaction (OER).....	71
<i>Bruce E. Koel</i>	
(334e) Lowering the Charge Overpotentials in Li-O₂ Battery By Tailoring the Oxygen Reduction and Evolution Reaction Energetics Using Non-Precious Metal Oxide Electrocatalysts.....	72
<i>Samji Samira, Ayad Nacy, Eranda Nikolla</i>	
(334f) Density Functional Theory Study of Oxygen Evolution Reaction on Specific Terminated Facets of Perovskite Oxides	73
<i>Nicholas Apodaca, Pabitra Choudhury</i>	
(334g) Core-Shell Nanoparticles for Efficient Oxygen Evolution Electrocatalysis in Alkaline and Acidic Media	74
<i>Alaina Strickler, Maria Escudero-Escribano, Thomas F. Jaramillo</i>	
(408j) Gas Capture by Ionic liquids	75
<i>Xiaochun Zhang, Suojiang Zhang</i>	
(408d) Thermoeconomic Optimization of Reverse Brayton Cycle Based Cryocooler for HTS Power Transmission Cable	76
<i>Aman Dhillon, Parthasarathi Ghosh</i>	
(408e) Technology Readiness Levels As a Framework for Techno-Economic Assessment	77
<i>Georg A. Buchner, Arno W. Zimmermann, Annika Marxen, Kai J. Stepputat, Arian E. Hohgrave, Reinhard Schomacker</i>	

(408f) Techno-Economic Modeling and Optimization of Catalytic Reactive Distillation for Bio-Oil Upgradation	78
<i>M. Arif Khan, Yusuf G. Adewuyi</i>	
(408g) Superstructure Optimization of Membrane-Based Carbon Capture Systems	79
<i>Miguel A. Zamarripa, Samir Budhathoki, Olukayode Ajayi, Janice A. Steckel, Christopher E. Wilmer, Michael S. Matuszewski, David C. Miller</i>	
(408k) Making Hydrogen from Water with a Protein Organized Electrode: Ultra-High Utilization of Noble Metal in Proton Exchange Membrane Electrolysis for Capital Cost Reduction	80
<i>Nuttanit Pramounmat, Julie N. Renner</i>	
(408i) Design Optimization and Economic Evaluation of LNG/NGL Integrated Processes Under Lean Feed Composition	81
<i>Chunhe Jin, Youngsub Lim</i>	
(418a) Electrochemical Deposition of Sr and Ba into Liquid Bi from Molten Salt Electrolytes	82
<i>Timothy Lichtenstein, Thomas Nigl, Nathan Smith, Hojong Kim</i>	
(418b) Electrochemical Separation of Cs from Molten Salts Using Liquid Metal Electrodes.....	83
<i>Nathan Smith, Thomas Nigl, Hojong Kim</i>	
(418c) Electrochemical Analysis of Bi-Analyte Electrorefiner Salt with High Concentration of Cl₃.....	84
<i>Chao Zhang, Devin S. Rappleye, Jaron Wallace, Michael F. Simpson</i>	
(418d) Monitoring of Actinide Concentrations in Molten LiCl-KCl Salt Using Alpha Spectroscopy	85
<i>Nora Alnajjar, Silvia Padilla, Milan Stika, Joshua Jarrell, Lei Cao, Michael F. Simpson</i>	
(418e) Thermodynamic Properties of Strontium-Lead Alloys Determined By Electromotive Force Measurements	86
<i>Thomas P. Nigl, Timothy Lichtenstein, Nathan Smith, Jarrod Gesualdi, Yuran Kong, Hojong Kim</i>	
(418f) Evaluation of Concentrations of Residual Water, Hydroxides, and Oxides in Molten Anhydrous CaCl₂.....	87
<i>Emma Faulkner, Michael F. Simpson</i>	
(418g) A Lightweight Betaemitter for Power Applications	88
<i>Patrick J. Pinhero</i>	
(424a) Adsorption and Filtration of Lignocellulosic Hydrolyzates Using Fibrous Depth Filters.....	89
<i>Mary Jennifer Puthota, Thomas D. Stuart, Bandaru V. Ramarao</i>	
(424b) Process Modeling, Simulation and Optimization of Process Intensification in Integrated Biorefineries	90
<i>Huajiang Huang, Shri Ramaswamy</i>	
(424c) Process Intensification of the Hydrolysis of Cellulosic Fibers By Integration of Membrane Separations and Hydrolysis for Enzyme Recycle.....	91
<i>Venkata Jampana, Bandaru V. Ramarao</i>	
(424d) A Low Energy Separation Process to Isolate Xylose from Aqueous Hydrolyzate Streams	92
<i>Jagannadh Satyavolu</i>	
(446a) Organotemplate-Free Beta Zeolites: From Zeolite Synthesis to Hierarchical Structure Creation	93
<i>Ke Zhang, Sergio Fernandez, Michele L. Ostraat</i>	
(446b) Tuning the Molecular Design of Tertiary Amine Catalysts on Amorphous Mesoporous Silica Supports for Selective Glucose Isomerization and Acid-Base Cooperative Reactions.....	94
<i>Nicholas Brunelli, Nitish Deshpande, Takeshi Kobayashi, Chi-Ta Yang, Eun Hyun Cho, Mariah Whitaker, Aamena Parulkar, Marek Pruski, Li-Chiang Lin</i>	
(446c) Template Free Synthesis of Palladium Immobilized Ordered Mesoporous Resin for Drug Synthesis on a Chip.....	95
<i>Mahboubeh Nabaviniia, Alexander Hesketh, Philip Wall, Elizabeth Kuhlman, Justin Ryan, Sabrina Rittwege, Matthew Knighton, Amanda Christon, Meagan Schweiger, Bridget Black, Alexis Lawless-Gattone, Iman Noshadi</i>	
(446d) Mesoporous Zeolites Produced By Solid Crystallization and Their Hydrogenation Properties	96
<i>Yuxin Wang, Cody Baxter, Yixin Liao, Shengnian Wang</i>	
(446e) Pillared Two-Dimensional Titanium Silicalite-1 Zeolite: Synthesis, Characterization and Catalytic Applications	97
<i>Wei Wu, Dongxia Liu</i>	
(446f) Synthesis Methods to Influence Framework Al Arrangements in CHA Zeolites and Consequences for NO_x Selective Catalytic Reduction.....	98
<i>John R. Di Iorio, Sichi Li, Subramanian Prasad, Ahmad Moini, William F. Schneider, Rajamani Gounder</i>	
(446g) Unraveling and Tuning Surface and Catalytic Chemistry of Zr₆O₈ Nodes in Metal Organic Frameworks	99
<i>Dong Yang, Ruiping Wei, Guozhu Li, Qin Wu, Bruce C. Gates</i>	
(482a) Rapid and Low Temperature (< 80°C) Hydrotrope Chemistry for Economic and Sustainable Production of Sugar/Biofuels, and Lignocellulosic Nanomaterials.....	100
<i>J. Y. Zhu</i>	

(482b) HPLC/Qtof-MS for Analysis of Oligomeric Compounds (pyrolytic lignin) from Crude Bio-Oils and Products from Pyrolysis of Model Compounds	101
<i>Simin Li, Wenbo Wang, Kongyu Lu, Yi Yang, Zhongyang Luo</i>	
(482d) Steam Reforming of Toluene and Biomass Tar over Biochar Supported Ni Nanoparticles: Effects of Ni Particle Size on Catalytic Activity and Stability.....	102
<i>Zhenyi Du</i>	
(482e) Optimize Fermentation Conditions By Using Glucose As a Substrate to Produce (R)-3-Hydroxybutyric Acid with Burkholderia Cepacia.....	103
<i>Guoyu Dong, Shijie Liu</i>	
(482f) Organosolv Pretreatment of Hybrid Pennisetum for the Production of Lignin and Enzymatically Digestible Cellulose.....	104
<i>Xinshu Zhuang, Xuesong Tan, Wen Wang, Qiang Yu, Wei Qi, Qiong Wang, Zhenhong Yuan</i>	
(535a) Dual Functional Zr-KIT-5 Shows Remarkable Activity for Depolymerization of Corn Stover Lignin into Stable Phenolic Monomers.....	105
<i>Kakasaheb Nandiwale, Andrew Danby, Anand Ramanathan, R. V. Chaudhari, Bala Subramaniam</i>	
(535b) Reaction Condition Optimization for the Scalability of 1,4-Anhydroerythritol and Xylitol Conversion Via Heterogeneous ReO_x-Pd/CeO₂ Catalysis	106
<i>Blake Macqueen, Elizabeth Barrow, Jochen Lauterbach</i>	
(535c) Selective Tuning of the Glycerol C-O Bond Cleavage Sequence on Copper-Modified Molybdenum Carbide Surfaces.....	107
<i>Zhexi Lin, Weiming Wan, Salai C. Ammal, Kyung-Eun You, Andreas Heyden, Jingguang G. Chen</i>	
(535d) Oxophilic Metal Oxide Modified Iridium Catalysts for Selective Production of Renewable Hydrocarbons	108
<i>Sibao Liu, Basudeb Saha, Dionisios G. Vlachos</i>	
(535e) Localizing Microwave Heat By Surface Polarization of Titanate Nanostructures for Enhanced Catalytic Reaction Efficiency	109
<i>Tuo Ji, Jiahua Zhu</i>	
(535f) Selective Glucose to Fructose Isomerization over Modified Zirconium UiO-66 in Alcohol Media.....	110
<i>Matheus Dorneles De Mello, Michael Tsapatsis</i>	
(535g) Production of Biorenewable Monomers - from Fructose to 2,5-Furandicarboxylic Acid.....	111
<i>Ali Hussain Motagamwala, Wangyun Won, David Martin Alonso, Christos Maravelias, James A. Dumesic</i>	
(540a) Comparative Analysis of Microalgae Productivity Potential and Economic Analysis in Open Raceway Ponds and Flat Panel Photobioreactors	112
<i>Sudhanya Banerjee, Shri Ramaswamy</i>	
(540b) Subcritical Extraction of Chlorella Pyrenoidosa: Optimization through Response Surface Methodology.....	113
<i>Selvakumar Thiruvenkadam, Michael K. Danquah, Razif Harun</i>	
(540c) Lignin-Derived Deep Eutectic Solvents Pretreatment of Herbal Residues to Enhance Enzymatic Digestibility of Cellulose	114
<i>Qiang Yu, Long Chen, Xinshu Zhuang, Zhenhong Yuan</i>	
(691a) Evaluation of Structure, Topochemistry and Transport Reaction Processes in Plant Biomass during Pretreatment	115
<i>Sahana Ramanna, Bandaru V. Ramarao, Feng Xu, Shri Ramaswamy</i>	
(591a) Production of 5-Hydroxymethylfurfural from Glucose Using an Al³⁺ Promoted Acidic Phenol-formaldehyde Resin Catalyst	116
<i>Tingwei Zhang, Wenzhi Li</i>	
(591e) Low Temperature and High Efficiency Biomass Fuel Cell and Bio-Hydrogen Production	131
<i>Yulin Deng</i>	
(591c) Nano Core-Shell Structured ZSM-5@Mesoporous Silica for Catalytic Co-Cracking Phenolic Bio-Oil Model Compounds and Ethanol to Aromatics	132
<i>Wenbo Wang, Simin Li, Yi Yang, Shuang Xue, Kongyu Lu, Zhongyang Luo</i>	
(635a) Does Recrystallization in Aqueous Environment Affect the Reactivity of Ball-Milled Cellulose for Acid Catalyzed Hydrolysis?	133
<i>Maksim Tyufekchiev, Alex Kolodziejczak, Patricia Guerra, James Meyer, Pu Duan, Frederick Greenaway, Marcus Foston, Klaus Schmidt-Rohr, Michael T. Timko</i>	
(635b) Solvent and Processing Conditions for Pretreatment and Dissolution of Cotton Cellulose	134
<i>Mohammad Ghasemi, Luz V. Vargas-Aponte, Paschalis Alexandridis, Marina Tsianou</i>	
(635c) Synthesis of Artificial Lignin Polymers and Their Effects on Enzymatic Hydrolysis of Cellulose	135
<i>Conghui Yue, Hairong Guan, Maobing Tu</i>	
(635d) Effect of Lignin Alkylation in Organosolv Pretreatment on Enzymatic Hydrolysis	136
<i>Yequan Sheng, Chenhuan Lai, Maobing Tu</i>	

(640a) Effects of Warm Water Washing on the Fast Pyrolysis of Arundo Donax.....	137
<i>Devin Chandler, Fernando Resende</i>	
(640b) Ex-Situ Catalytic Cracking of Biomass Pyrolysis Vapors over Montmorillonite K10-Supported Iron (III) Oxide	138
<i>Candice Ellison, Dorin Boldor</i>	
(640c) Iron-Based Chemical Looping Biomass Gasification for Carbon Nanofiber Production: Process Simulation and Experiments.....	139
<i>Fanhe Kong, Elliot Kennel, Robert Statnick, Mandar Kathe, Andrew Tong, Chenghao Wang, Dikai Xu, Eric Falascino, Yan Liu, Liang-Shih Fan</i>	
(640d) Techno-Economic Analysis of Simultaneous Biomass Gasification and Syngas Upgrading Via Chemical Looping Technology	140
<i>Micah Jasper, Abloghasem Shahbazi, Keith Schimmel, Lijun Wang</i>	
(640f) Study of Effect of Reaction Conditions on the Hydrothermal Liquefaction Reaction Followed By Steam Reforming of the Liquefaction Liquid	141
<i>Haider Niaz, Yong Beom Park, J. Jay Liu, Hee-Chul Woo</i>	
(649b) Effect of Distinctive Detoxification on Inhibitors Removal and Butanol Fermentation of Poplar Prehydrolysates.....	142
<i>Yu Zhang, Maobing Tu, Changlei Xia</i>	
(649c) Increased Lactic Acid Production in Fermentation Process from Woody Biomass and Its Kinetic Modelling	143
<i>Jiaqi Huang, Shijie Liu</i>	
(649d) Carbon-Based Solid Acid Pretreatment in Corncob Saccharification: Specific Xylose Production and Efficient Enzymatic Hydrolysis	144
<i>Wei Qi</i>	
(649e) Hydrolysis of Cellulose and Its Adsorption Performance on Heavy Metal Irons	145
<i>Yaoyao Wang, Shijie Liu</i>	
(651a) Introduction of Self-Steam Explosion Pretreatment Technology for Wet Biomass.....	146
<i>Dedy Eka Priyanto</i>	
(651c) Non-Equilibrium Plasma Pretreatment of Biomass for Enhanced Conversion	147
<i>A. Lusi, Haiyang Hu, Hui Hu, Xianglan Bai</i>	
(651d) Effect of Aromatic Additives on Dilute Acid Pretreatment of Aspen	148
<i>Yequan Sheng, Maobing Tu, Changlei Xia</i>	
(651e) Fractionation, Conversion, and Valorization of Lignocellulosic Biomass in Inorganic Ionic Liquid (Molten Salt Hydrate)	149
<i>Xuejun Pan</i>	
(651f) Are Lignocellulosic Feedstocks Commercially Relevant to Make Pure Sugars for Chemical Catalytic Upgrading?	150
<i>Sampath Gunukula, Hemant P. Pendse, Thomas J. Schwartz, Adriaan Van Heiningen, William J. Desisto, M. Clayton Wheeler</i>	
(655a) Catalytic Etherification of Glycerol to Glycerol Oligomers in the Presence of Alumina Supported Ca/Sr Mixed Oxides.....	151
<i>Yi-Chen Shih, Bing-Hung Chen</i>	
(655b) The Role of Copper Stability in Selectively Condensation of Ethanol to Higher Alcohols	152
<i>Mond Guo, Karthikeyan K. Ramasamy</i>	
(655c) Effects of Alloying Pd and Cu on Tandem Dehydrogenation-Aldol Condensation Reactions	153
<i>Konstantinos A. Goulas, Yuying Song, Lars C. Grabow, Dean Toste</i>	
(655d) Lubricant Base Oils Production from Biomass	154
<i>Sibao Liu, Basudeb Saha, Dionisios G. Vlachos</i>	
(655e) Selectivity Control during the One-Pot Conversion of Aliphatic Carboxylic Acids to Linear Olefins through Tandem Hydrogenation/Dehydration	155
<i>Jher Hau Yeap, Bartosz Rozmyslowicz, Jeremy S. Luterbacher</i>	
(655f) Mechanism and Kinetics of Isobutene Production over Zirconia-Supported Zinc Oxides	156
<i>Julie Rorrer, Alexis T. Bell, Dean Toste</i>	
(655g) Catalytic Upgrading of Sugar-Derived Polyols to Glycols in Absence of Externally Added Hydrogen	157
<i>Bin Yin, Xin Jin, Guangyu Zhang, Hao Yan, Chaohe Yang</i>	
(655h) Selective C-C Bond Scission of Primary Alcohols Using Cerium Oxide-Supported Palladium Catalyst.....	158
<i>Tomoo Mizugaki, Kodai Nitta, Takato Mitsudome, Koichiro Jitsukawa</i>	
(690a) Electricity Performance of Microbial Fuel Cell with Mixed Inoculation of Yeast and E.coli.....	159
<i>Jinxia Yuan, Shijie Liu</i>	

(690c) Biological Detoxification of Lignocellulosic Biomass Hydrolysate Liquor for Enhanced Ethanol Production	160
<i>Bhanendra Singh, Saurav Datta</i>	
(690e) From Starch-Enriched Algal Biomass to Biobutanol Production - a Model-Based Optimisation Study	161
<i>Gonzalo M. Figueroa-Torres, Jon Pittman, Constantinos Theodoropoulos</i>	
(540e) Analysis of the Topochemistry of Lignocellulosic Biomass and Modeling of the Reaction Dissolution Phenomena	162
<i>Christopher M. Thomas, Bandaru V. Ramarao, Sahana Ramanna, Shri Ramaswamy, Feng Xu</i>	
(691b) Biomass Torrefaction in a Pulsed Fluidized Bed	163
<i>Ruixu Wang, Ziliang Wang, Xiaotao Bi, C. Jim Lim, Shahab Sokhansanj</i>	
(691c) Co-Hydrothermal Carbonization of Coal Refuse and Cow Manure Blend	164
<i>Shanta Mazumder, M. Toufiq Reza</i>	
(691d) Advanced Characterization of Poplar Variants for Understanding Plant Cell Wall Recalcitrance	165
<i>Samarthyia Bhagia, Jaroslav Durkovic, Rastislav Lagana, Riddhi Shah, Chang Geun Yoo, Sai V. Pingali, Hugh O'Neill, Wellington Muchero, Gerald Tuskan, Brian H. Davison, Arthur J. Ragauskas</i>	
(691e) Simulation of CO₂ Gasification of Manure-Derived Hydrochar Using Aspen Plus	166
<i>Pretom Saha, M. Toufiq Reza</i>	
(691f) Biomass Residue Characterization for Their Potential Application As Biofuels	167
<i>Mudasir A Shah</i>	
(695a) Gas Phase Catalytic Oxidation of Lignin to Produce Phenolic Compounds over Vanadia Catalysts	168
<i>Matthew M. Yung, Calvin Mukarakate, Mark Nimlos, Michael B. Griffin, Seonah Kim, Eric C. D. Tan</i>	
(695b) Mechanistic Study of the Hydrogenolysis of Diaryl Ethers Catalyzed By Heterogeneous Metal Catalysts	169
<i>Meng Wang, Oliver Gutierrez, Donald M. Camaiori, Johannes A. Lercher</i>	
(695c) Palladium-Iron Bimetallic Catalyst: High Activity and Stability for Aqueous Phase Hydrogenations	170
<i>Yan Cheng, Hien N. Pham, Robert L. Johnson, Brent H. Shanks, Abhaya K. Datye</i>	
(695d) Hydrodeoxygenation of Guaiacol over Ni and Mo Nanoparticles Supported on SBA-15 and γ-Al₂O₃	171
<i>Thiago L. R. Hewer, Rubens W. S. Lima, Reinaldo Giudici, Martin Schmal, Rita M. B. Alves</i>	
(695e) Hydropyrolysis of Biomass-Derived Oxygenates on Metal-Exchanged Zeolites Using Light Alkanes As the Source of Hydrogen	174
<i>Dante Simonetti, Eric Lin</i>	
(695f) Flowthrough Reductive Catalytic Fractionation of Biomass	175
<i>Eric Anderson, Michael Stone, Rui Katahira, Michelle Reed, Gregg T. Beckham, Yuriy Roman-Leshkov</i>	
(695h) Hydrodeoxygenation of Sorbitol to Monofunctional Fuel Precursors over Co/TiO₂	176
<i>Nathaniel Eagan, Joseph P. Chada, Ashley Wittrig, J. Scott Buchanan, George W. Huber, James A. Dumesic</i>	
(730a) Catalytic Hydrogenation of Furfural over Rumop: Probing Bimetallic and Compositional Effects on Catalyst Performance	177
<i>Yolanda Bonita, Timothy O'Connell, Jason C. Hicks</i>	
(730c) Etherification of 5-Hydroxymethylfurfural Using Zeolite Catalysts	178
<i>Meredith Allen, Spencer Martell, Akbar Mahdavi Shakib, William M. Gramlich, Brian G. Frederick, Thomas J. Schwartz</i>	
(730d) Mechanistic Insights into the Hydrogenolysis of Levoglucosanol over Bifunctional Platinum Silica-Alumina Catalysts in Tetrahydrofuran Solvent	179
<i>Siddarth H. Krishna, Rajeev Assary, Quinn A. Rashke, Zachary R. Schmidt, Larry Curtiss, James A. Dumesic, George W. Huber</i>	
(730e) Hydrothermal Stability of Chloromethyl Polystyrene Based Solid Acid Catalysts and Mechanism of Cellulose Hydrolysis	180
<i>Maksim Tyufekchiev, Jordan Finzel, Pu Duan, Klaus Schmidt-Rohr, Sergio Granados-Focil, Marion Emmert, Michael T. Timko</i>	
(730f) Glycerol Transfer-Hydrogenation of Levulinic Acid Using Ru and Ir Carbene Organometallics Immobilized on Active Hydrotalcites	181
<i>Jacob Heltzel, Kai Wang, Matthew Finn, Evan Sandefur, Adelina Voutchkova-Kostal</i>	
(730g) Paired Electrocatalytic Hydrogenation and Oxidation of 5-Hydroxymethylfurfural for Efficient Production of Biorenewable Monomers	182
<i>Xiaotong Chadderdon, David Chadderdon, Wenzhen Li</i>	
(730h) A Full Furfural Utilization over Ni/SiO₂ Catalysts	183
<i>Sheng-Chiang Yang, Shawn D. Lin</i>	

(734a) Multi-Objective and Dynamic Real-Time Optimization of Postcombustion Carbon Capture Processes for Cycling Applications.....	184
<i>Rebecca Kim, Fernando V. Lima</i>	
(734b) Dynamic Modeling and Control of a Post-Combustion Solid-Sorbent Capture System with the Cesi Models and Tools.....	185
<i>Benjamin P. Omell, Priyadarshi Mahapatra, Debangsu Bhattacharyya, David C. Miller</i>	
(734c) Application of a Data-Driven Modeling Approach to a Large-Scale Power Plant.....	186
<i>Seyed Mostafa Safdarnejad, Jacob F. Tuttle, Kody Powell</i>	
(734d) Model-Based Analysis of a Thermofluidic Engine for Low-Grade Heat Recovery: Accounting for Irreversible Thermal Losses	187
<i>Yukun Wang, Christos N. Markides, Benoit Chachuat</i>	
(734e) Model Predictive Control Designs to Achieve Uniform Growth of Simultaneously Propagating Multiple Fractures in Hydraulic Fracturing	188
<i>Prashanth Siddhamshetty, Kan Wu, Joseph Sangil Kwon</i>	
(734f) Real-Time Control and Balancing of a Reformer Furnace	189
<i>Anh Tran, Marquis Crose, Madeleine Pont, Panagiotis D. Christofides</i>	
(734g) Finite Element Modeling and Optimization of Heat Exchangers.....	190
<i>Saif R. Kazi, Lorenz T. Biegler</i>	
(734h) Application of Paroc in the Optimization and Control of PEM Water Electrolysis Process.....	191
<i>Stratos Pistikopoulos, Gerald S. Ogumerem</i>	
(734i) Predictive Control of Solar Collector Energy System with Gaussian Process Priors of Uncertain Solar Irradiance.....	192
<i>Xiaodong Xu, Yuan Yuan, Stevan Dubljevic</i>	
Author Index	