

Forest and Plant Bioproducts Division 2015

Core Programming Area at the 2015 AIChE Annual Meeting

Salt Lake City, Utah, USA
8-13 November 2015

ISBN: 978-1-5108-1861-3

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© (2015) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2016)

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: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

(55a) Overview of Cellulose Nanomaterial Applications	1
<i>Yulin Deng</i>	
(55b) Emulsion of Poly (lignin-co-butyl acrylate) s As Biobased Coating Films	2
<i>Suguna Jairam, Fei Wang, Zhaohui Tong</i>	
(55c) Potential Applications of Functionalized Nanocrystalline Cellulose	3
<i>Xiao Zhang</i>	
(55d) UV Resistibility of Polystyrene Co-Butyl Acrylate (PSBA) Encapsulated Lignin-Saponite Nanohybrid Composite Film	4
<i>Suguna Jairam, Zhaohui Tong, Melanie Correll, TamilSelvan Sakthivel, Ray Bucklin, Sudipta Seal, John Truett</i>	
(56a) Dissolution of Lignin in Recalcitrant Biomass Using Ionic Liquid - Glycerol Mixtures	5
<i>Joan G. Lynam, Charles J. Coronella</i>	
(56b) Characterization of Lignins Produced from Woody Biomass Using Solvent Extraction	30
<i>Ruoshui Ma, Carlos Alvarez-Vasco, Mond Guo, Xiao Zhang</i>	
(56d) Changes in Lignin Structure after Autohydrolysis Pretreatment Analyzed By Quantitative NMR Techniques	31
<i>Robert Narron, Qiang Han, Hasan Jameel, Hou-min Chang, Sunkyu Park</i>	
(56f) Extractives of Douglas-fir and their Implications for Fermentation Based Biofuel Production	32
<i>Karl Oleson, Kayla Sprenger, Jim Pfaendner, Daniel T. Schwartz</i>	
(124a) Supercritical Assisted Pretreatment of Cassava and Plantain Residues	35
<i>Laura V. Daza, Ramiro Betancourt, Carlos A. Cardona</i>	
(124b) New Trends to Improve the Quality of Recycled Papers	36
<i>Ana Balea, Carlos M Negro, Elena de la Fuente, Angeles Blanco</i>	
(124c) The Effects of Additives on the Optical and Mechanical Properties of Cellulose Nanocrystal Films	37
<i>Joshua M. Passantino, Alexander D. Haywood, Virginia A. Davis</i>	
(124d) Surface Modification of Cellulose Nanofibrils By Surfactant-Free Emulsion	54
<i>Arie Mulyadi, Yulin Deng</i>	
(167a) A Quantitative Determination of the Specific and Nonspecific Interaction Forces Between Carbohydrate-Binding Module of CBH1/Cel7A and Lignocellulosic Biomass	55
<i>Baran Arslan, Mert Colpan, Xiaohui Ju, Xiao Zhang, Nehal I. Abu-Lail</i>	
(167b) Zeta Potential of Lignin Plays a Positive Role in the Enzymatic Hydrolysis of Woody Biomass	58
<i>Maobing Tu, Yang Huang</i>	
(167c) Solvent Effects on the Dissolution and Precipitation of Cellulosic Biomass from Ionic Liquids	59
<i>David L. Minnick, Aaron M. Scurto</i>	
(167d) Investigations into the Structural and Genetic Factors behind the Biomass Recalcitrance of Douglas Fir	60
<i>Scott Geleynse, Xiao Zhang</i>	
(167e) Dissolution of Cellulosic Fibers: Effect of Fiber Morphology and Size	61
<i>Mohammad Ghasemi, Marina Tsianou, Paschalis Alexandridis</i>	
(167f) Comparing Maximum Overall Pretreatment and Enzymatic Hydrolysis Sugar Yields from Poplar Wood Following THF Co-Solvent Enhanced Lignocellulosic Fractionation (CELf), Dilute Acid, and Organosolv Pretreatments	62
<i>Rachna Dhir, Charles M. Cai, Rajeev Kumar, Charles Wyman</i>	
(191a) Polyoxometalates As Catalyst for Valorization of Lignin to Produce Aromatic Chemicals and Hydrogen	63
<i>Xu Du, Wei Liu, Yulin Deng</i>	
(191b) Investigation of Nanostructural Characteristics of Lignin-ABA Block Copolymer Aggregates Leading to Use of Micelles As Nanoreactors for Lignin Conversion	64
<i>Mohammadali Azadfar, William C. Hiscox, Shulin Chen</i>	
(191c) Lightweight Functional Material from Sustainable Resources: Lignin-Soy Aerogels	65
<i>Ingrid Hoeger, Carlos Salas, Orlando J. Rojas</i>	
(191d) Generating Ultrapure Lignins from Kraft Pulp Mill Lignins Via the ALPHA Technique	66
<i>Adam S. Klett, Mark C. Thies</i>	
(191e) Vanillyl Alcohol: A Renewable Epoxy Resin Building Block	67
<i>Joseph F. Stanzione, Eric D. Hernandez, Joshua M. Sadler, John J. La Scala</i>	

(191f) Systems Biology-Guided Biodesign of Consolidated Lignin Conversion	68
<i>Lu Lin, Yanbing Cheng, Yunqiao Pu, Su Sun, Xiao Li, Elizabeth Pierson, Dennis Gross, Susie Dai, Arthur J. Ragauskas, Joshua Yuan</i>	
Functionalization of Pyrolyzed Biomass and Their Characterizations	69
<i>Andrew Anstey, Singaravelu Vivekanandhan, Arturo Rodriguez-Urbe, Amar K. Mohanty, Manju Misra</i>	
(198a) Effect of Stirring Ball Milling on Structure and Hydrolysis of Camphorwood Sawdust	70
<i>Houfang Lu, Bin Liang, Yongdan Li</i>	
(198b) Hydrothermal Carbonization of Different Biomass Types	71
<i>Joan G. Lynam, M. Toufiq Reza, Wei Yan, Victor R. Vasquez, Charles J. Coronella</i>	
(198d) The Relation of Lignin Structural Properties and the Conversion Reactivity to Value-Added Chemicals	83
<i>Ruoshui Ma, Xiao Zhang, Mond Guo</i>	
(198e) Integrated Thermochemical Process Design for Co-Producing Liquid Fuels and Propylene	84
<i>Zhihong Yuan, Pengcheng Li, Bernardo Lousada, Mario Richard Eden</i>	
(270a) Graphitic Bio-Carbon from Lignin Biomass Synthesized with Nickel Nitrate Catalyst	85
<i>Muslum Demir, Ahmed A. Farghaly, Maryanne M Collinson, Burak Aksoy, Naveen K. R. Palapati, Arunkumar Subramanian, Harry T. Cullinan, Ram B. Gupta</i>	
(270b) High Efficient Biomass-to-Hydrogen Conversion By Polyoxometalate Solution Catalyzed Electrolysis	86
<i>Wei Liu, Yong Cui, Xu Du, Zhe Zhang, Yulin Deng</i>	
(270c) Qualitative and Quantitative Characterization of Biomass Using FT-IR Microspectroscopy and X-Ray Diffraction	87
<i>C. Luke Williams, Amber Hoover, Rachel Emerson, Lucia M. Petkovic, Daniel Stevens, Tyler L. Westover</i>	
(270d) Value-Added Products from Thermal Treatment of Biomass Pyrolysis Oil	88
<i>Matthew Lemieux, Swomitra Mohanty, Eric Eddings</i>	
(270e) Corncob Hydrolysate Based Media for Pigments Production By Penicillium Purpurogenum GH2: Kinetics and Modeling	89
<i>Lourdes Morales-Oyervides, J. C. Montanez, Alejandro Mendez-Zavala</i>	
(270f) New Biopolyester from Co-Product of Biodiesel Industries: Synthesis, Characterization and Blending	90
<i>Oscar Valerio, Manju Misra, Amar K. Mohanty</i>	
(318a) Model of Ink Particle Separation in Column Flotation Deinking	91
<i>Alak Bandyopadhyay, Bandaru V. Ramarao</i>	
(318b) Pervaporation-Assisted Catalytic Conversion of Xylose to Furfural	92
<i>Alex Wang, Nitash Balsara, Alexis T. Bell</i>	
(318c) Kinetics of the Enzymatic Hydrolysis of Papermaking Pulp Fines	93
<i>Bandaru Ramarao, Byeong Cheol Min, R Kasinathan</i>	
(318d) Bioreactor Process Model for Microalgae Production Systems	94
<i>Sudhanya Banerjee, Hua-Jiang Huang, Shri Ramaswamy</i>	
(318e) Integrated Bioprocessing and Separation and Purification Technology for Advanced Biofuels and Biochemicals	95
<i>Hua-Jiang Huang, Pedro Rezende, Shri Ramaswamy</i>	
(318f) Reuse of Deinking Sludge from Recycled Paper Industry in Light Fired Clay Bricks	96
<i>Vivek Kumar, Shilpa Kulkarni, S.K. Singh, M. C. Bansal</i>	
(329a) Sustainable Green Composites from Bio-Nylon and Biochar	97
<i>Amar K. Mohanty, Emmanuel Ogunsona, Manju Misra</i>	
(329b) Chemical Control of Stickies in Recycled Paper Mills	98
<i>Virgilio Gonzalez</i>	
(329c) Biobased Engineering Plastic Blends for Automotive Application	99
<i>Yury Yuryev, Manju Misra, Amar K. Mohanty</i>	
(329d) The Influence of Processing Parameters and Use of a Chain Extender on the Mechanical and Thermal Properties of Injection Molded Poly (trimethylene terephthalate) Bioplastic	100
<i>Petri Myllytie, Manju Misra, Amar K. Mohanty</i>	
(329e) Synthesis and Characterization of Epoxy Resins Utilizing Plant-Derived Phenolic Acids	101
<i>Guozhen Yang, Hiruy Tesefay, Megan L. Robertson</i>	
(329f) Study of the Effects of Carbonization Parameters on the Structure of Carbonized Electrospun Lignin	102
<i>Vida Poursorkhabi, Manju Misra, Amar K. Mohanty</i>	
(332a) Using a Combined Hydrolysis Factor to Optimize High Titer Ethanol Production from Sulfite-Pretreated Poplar without Detoxification	103
<i>Jingzhi Zhang, J.Y. Zhu, Feng Gu, Ronald Zalesny, Jr</i>	

(332b) Advanced Biological and Chemical Design for Lignin Bioconversion	104
<i>Shangxian Xie, Cheng Zhao, Yunqiao Pu, Furong Lin, Su Sun, Susie Dai, Arthur J. Ragauskas, Joshua Yuan</i>	
(332c) Physio-Chemical Characterization of 3D Structure of Plant CELL Walls	105
<i>Shri Ramaswamy, Sahana Ramanna, Bandaru V. Ramarao</i>	
(332d) Phosphorus Recovery from Liquid Dairy Manure By Electrocoagulation	106
<i>Bo Hu, Xin Zhang, Hongjian Lin, Aravindan Rajendran, Cristiano Reis, Weiwei Liu</i>	
(332e) Estimation of Energy Consumption and Production in Woody Biomass Pulverization with a Multiple Tube Vibration Mill	107
<i>Nobusuke Kobayashi, Yoshinori Itaya</i>	
(332f) Lime Sludge: An Emerging Alternate Construction Building Material for the Partial Replacement of Fine Aggregate	108
<i>Vivek Kumar, Yogendra Soni, Shilpa Kulkarni, Prabhat Sharma, S.K. Singh</i>	
(386a) A New Method to Extract High Purity Lignin from Woody Biomass	109
<i>Carlos Alvarez-Vasco, Xiao Zhang</i>	
(386b) Technical Feasibility Evaluation of Alcohol-to-Jet (ATJ) Conversion Technology for Renewable Jet Fuel	110
<i>Scott Geleynse, Xiao Zhang, Michael Wolcott, Manuel Garcia-Perez</i>	
(386c) Dilute Alkali Treatment Followed By Mechanical Refining to Enhance Sugar Conversion	111
<i>Junyeong Park, Xiaowen Chen, Melvin Tucker, Hasan Jameel, Sunkyu Park</i>	
(386d) Investigation of Dissolved Lignin in Autohydrolysis Liquor	112
<i>Robert Narron, Kelsey Boes, Yufei Chen, Nelson R. Vinuesa, Sunkyu Park</i>	
(386e) Process Modeling of a Distributed Sugar Depot Approach to Biomass Conversion	113
<i>Mond Guo, Jinwu Wang, Michael Wolcott, Xiao Zhang</i>	
(386f) Simultaneous Conversion of All Cell Wall Components By Oleaginous Fungus without Chemical Physical Pretreatment	114
<i>Shangxian Xie, Xing Qin, Dhrubojyoti D. Laskar, Su Sun, Luis H. Reyes, Susie Dai, Scott Sattler, Katy Kao, Bin Yang, Xiaoyu Zhang, Joshua Yuan</i>	
(386g) Mixing Effects on the Reaction Kinetics and Dynamics of Saccharomyces Cerevisiae Mediated Glucose Fermentation to Bioethanol	115
<i>Ashwin Gaikwad</i>	
(424a) Study of Structural Characteristics of Lignin Fractions Obtained from Sequential Solvent Fractionation	116
<i>Shin Young Park, Jae-Young Kim, Joon Weon Choi</i>	
(424c) Green Coal Production from Biomass	117
<i>Stanislav Barskov, Prashanth Buchireddy, John Guillory, Mark Zappi</i>	
(424e) CO₂ Enhanced Gasification of Biomass Char - Catalytic Effects of Na, K, Ca, and Mg	118
<i>Narendra Sadhwani, Mario Richard Eden, Sushil Adhikari</i>	
(424f) Visualization of Miscanthus x Giganteus Cell Wall Deconstruction Subjected to Dilute Acid Pretreatment for Enhanced Enzymatic Digestibility	119
<i>Zhe Ji, Shri Ramaswamy, Feng Xu</i>	
(424d) Catalytic Fast Pyrolysis of Lignin Recovered from Hot-Water Extract of Electron-Beam-Irradiated Sugar Maple for the Production of Low Molecular Weight Phenolic Compounds	120
<i>Derek Corbett, Biljana Bujanovic</i>	
(424g) Alcohol Stabilization of Bio-Oils during High Temperature Treatment	121
<i>Laibao Zhang, Keisha B. Walters</i>	
(424h) Furnish Optimization for a Multilayered Paperboard	122
<i>Surendra Pal Singh, Prashant Soni</i>	
(424b) Greenhouse Gas Emissions of Ethanol Production from Lignocellulosic Biomass in Biorefinery System	123
<i>Soomin Myoung, Sunkyu Park</i>	
(424i) Briquetting Characteristics of Woody and Herbaceous Mixed Feedstocks	124
<i>Jaya Shankar Tumuluru, Ty Dansie, Craig Conner</i>	
(424j) Simulation and experiments of biomass pyrolysis for fuel gas with calcium oxide	127
<i>Baofeng Zhao, Xiaodong Zhang, Lei Chen, Laizhi Sun, Hongyu Si, Xiaolu Yi</i>	
(498a) Effect of Fast Pyrolysis Conditions on Structural Transformation and Reactivity of Herbaceous Biomasses at High Temperatures	128
<i>Anna Trubetskaya, Anker D. Jensen, Peter Arendt Jensen, Peter Glarborg, Hartmut Spliethoff, Mogens Larsen Andresen, Markus Steibel, Flemming Hofmann Larsen</i>	
(498b) Structural Characterization of Biomass Derived Biochar Using Electron Energy Loss Spectroscopy	136
<i>Seunghyun Yoo, Junyeong Park, Stephen Kelley, Sunkyu Park</i>	

(498c) Vibrational Characterization of Hydrothermal Chars: Simulation and Experiment	137
<i>Michael T. Timko, Avery Brown, Geoffrey Tompsett, Nathaniel Deskins</i>	
(498d) Biomass Pyrolysis for Closing Life Support Loops in Space	138
<i>Mansour Saberi, Catherine E. Brewer</i>	
(498e) Evaluation of Sugars and Bio-Oil Production Using Switchgrass Feedstock Grown in Heavy Metal Contaminated Soil	139
<i>Maria Nydia Ruiz-Felix, William J. Kelly, Ronald Balsamo, Justinus A. Satrio</i>	
(498f) 13C NMR Spectroscopic Investigation of the Effects of Functional Groups on Catalytic Pyrolysis Oil Properties	140
<i>Foster A. Agblevor, Ofei D. Mante</i>	
(498g) Controlling Phase Stability of Biomass Fast Pyrolysis Bio-Oils	141
<i>Anja Oasmaa, Tom Sundqvist, Eeva Kuoppala, Manuel Garcia-Perez, Yrjö Solantausta, Christian Lindfors</i>	
(501a) Liquid Hot Water Pretreatment of Lignocellulosic Biomass to Enhance Sugar Recovery and Enzymatic Digestibility of Cellulose	142
<i>Zhenhong Yuan, Xinshu Zhuang, Qiang Yu</i>	
(501b) An Aggregated Understanding of Alkaline Hydrogen Peroxide (AHP) Conversion of Biomass Hemicelluloses to Organic Acids	143
<i>Carlos Alvarez-Vasco, Xiao Zhang</i>	
(501c) Effect of Lignin Content on Hemicellulose Hydrolysis during Liquid Hot Water Pretreatment	144
<i>Qiang Yu, Zhenhong Yuan, Xinshu Zhuang</i>	
(501d) Hydrolysis Kinetics of Woody Biomass: Surface Renewal	145
<i>Shijie Liu</i>	
(501e) Gasoline Production By One-Pot Catalytic Conversion of Lignocellulosic Biomass Derived Sugar/Polyol	146
<i>Tiejun Wang</i>	
(501f) Micro-Aerobic Fermentative Hydrogen Production from Corn Stalk	147
<i>Dong Li, Xiaofeng Liu</i>	
(501g) Integrated Technology for Liquid Biofuels and Bioproducts from Lignocellulose	148
<i>Jianan Zhang</i>	
(560a) Production of High Quality Bio-Oil Via Fast Co-Pyrolysis (FCP) of Cellulose and Polypropylene	149
<i>Deepak Ojha, R. Vinu</i>	
(560b) Advanced Fuels and Coproducts from Guayule and Algal Feedstocks Via Tail-Gas Reactive Pyrolysis (TGRP) and Subsequent Upgrading	151
<i>Yaseen Elkasabi, Akwasi A. Boateng, Charles A. Mullen, Bruna M.E. Chagas</i>	
(560c) Hydrothermal Liquefaction: Effect of Various Waste Streams As Reaction Medium	152
<i>M. Toufiq Reza, Charles J. Coronella, Alireza Shekariz</i>	
(560d) Chemical Modification of Hydrothermal Chars Using Mechanical Energy	153
<i>Michael T. Timko, Avery Brown, Brendan Mckeogh, Juan Venegas, Geoffrey Tompsett</i>	
(560e) Supercritical Water Hydrolysis of Biomass	154
<i>Manuk Colakyan, Danilo Cantero, Maria Jose Cocero Alonso</i>	
(560f) Characterization of Products from Base Catalyzed Depolymerization of Lignins to Determine Changes in Chemical Structure	157
<i>David K. Johnson</i>	
(564a) Hydrolysis of Ddg	172
<i>Shijie Liu, Alex (Hanchi) Chen</i>	
(564b) How Do Hemicelluloses Affect the Lignocellulose Enzymatic Digestibility	173
<i>Hongmei Chen, Xuebing Zhao</i>	
(564c) High-Yield Production of Furans from Lignocellulosic Biomass Under Mild Conditions in a Biphasic Process with Molten Salt Hydrate	174
<i>Chang Geun Yoo, Shuting Zhang, Xuejun Pan</i>	
(564d) Study on Co-Pyrolysis Characteristics of Rice Husk and Ammonium Salts	175
<i>Xifeng Zhu, Kai Li</i>	
(564e) Progress on Furfural Production Using Xylose-Rich Hydrolysate from Hardwood Autohydrolysis Pretreatment	176
<i>Lu Liu, Hou-min Chang, Hasan Jameel, Sunkyu Park</i>	
(615a) Effect of Fast Pyrolysis Conditions on the Biomass Solid Residues at High Temperatures (1000-1400° C)	177
<i>Anna Trubetskaya, Anker D. Jensen, Peter Arendt Jensen, Peter Glarborg, Kentaro Umeki, Angel David Garcia Llamas</i>	

(615b) Small-Scale Biomass Gasification - Research on Entrained Flow and Fluidized Bed Gasification Technology	185
<i>Sebastian Fendt, Hartmut Spliethoff</i>	
(615c) Catalytic Effect of Na, K, Ca and Mg on CO₂ Enhanced Gasification of Biomass Char	186
<i>Narendra Sadhwani, Mario Richard Eden, Sushil Adhikari</i>	
(615d) Co-Gasification of Sugarcane Bagasse with Cane Leaves/Tops: Role of Potassium Migration on Char Reactivity	187
<i>Mohmed Akil Syed, Pradeep K. Agrawal, Carsten Sievers, John D. Muzzy, John Henley, Derrick W Flick</i>	
(615e) Experimental Results of Gasification of Raw Pine	188
<i>Md Waliul Islam, Prashanth R. Buchireddy, John L. Guillory, Mark E. Zappi, Jude Asonganyi, Robert Bentley, Derek Richard, Ben Russo, Keith Crump</i>	
(615f) Investigation of Effective Parameters on Biomass Gasification in Circulating Fluidized Bed Gasifiers	189
<i>Guilnaz Mirmoshtaghi, Jan Skvaril, Eva Thorin, Hailong Li, Erik Dahlquist</i>	
(619a) Gasification of Maize Cob Catalyzed By Modified Iron-Rich Red Mud Extract	201
<i>Tian Qi, Tingzhou Lei</i>	
(619b) Integration and Chemical and Fuel Intermediate Production from Post-Consumer Municipal Solid Waste	202
<i>Ling Liang, Chenlin Li, Qian He, Marcello Somma, Nicola D'Alessio, Ning Sun, Todd Pray</i>	
(619c) Exploring the Impact of Cellulose Accessibility on Lignocellulosic Hydrolysis Using a Modified Simons' Staining Assay and a 1-Methylimidazole Pretreatment Process	203
<i>Thomas Kwok, Yuzhi Kang, Matthew J. Realf, Andreas S. Bommarius</i>	
(619d) Effects of Multiple Inhibitions in Corn Cob Hydrolysate on the Lipid Production of Rhodotorula Glutinis	204
<i>Hongjuan Liu, Zhangnan Lin, Jianan Zhang</i>	
(619e) Development of a Blended Feedstock Strategy to Address Challenges of Feedstock Cost for Biochemical Conversion of Lignocellulosic Biomass	205
<i>Allison E. Ray, Daniel Stevens, Ross Hays, Kastli D. Schaller, Amber Hoover, Chenlin Li, Ingrid Hoeger, Sunky Park</i>	
(619f) Biogas Production Trend at Various Temperature Conditions and Methane Enrichment Using Solvent Absorption Method	206
<i>Muhammad Suleman Tahir, Malik Zeshan, Khurram Shahzad</i>	
(627a) Using Microbial Consortia to Increase the Productivity of Algal Open Ponds	207
<i>Jose A. Gomez, Kai Höffner, Paul I. Barton</i>	
(627b) Algal Culture with a Nitrogen Fixing Bacterium for Sustainable Biomass Production	209
<i>Brett M. Barney</i>	
(627c) A Novel Symbiotic Biofilm for Algae Growth and Harvesting	210
<i>Aravindan Rajendran, Cristiano E. R. Reis, Yanmei Zhang, Hongjian Lin, Xin Zhang, Bo Hu</i>	
(627d) Insight into Lipid Biogenesis Using Stable Isotope Tracers Coupled with NMR Spectroscopy and Mass Spectrometry	211
<i>Robert Gardner, Greg Helms, William Hiscox, Brent Peyton, Robin Gerlach</i>	
(627e) Innovative Algal Process and System for Sustainable Biofuels and Biochemicals Production	212
<i>Roger Ruan</i>	
(627f) Integrated Computational and Experimental Studies of Microalgal-Based FUEL Production	213
<i>Mesut Bekirogullari, Jon Pittman, Constantinos Theodoropoulos</i>	
Author Index	