The Effect of Interdroplet Spacing and Droplet Volume on the Dissolution Profiles of Ink-Jet Printed Dopamine Hydrochloride
Paper 6911
Marina Brevuto* (1), Paul Nathaniel (2)
(1) Rutgers, The State University of New Jersey, New Brunswick, NJ
(2) Rutgers, The State University of New Jersey, New Brunswick, NJ

An Innovative Computer-Aided Molecular Design Approach to the Rational Design of Novel Small Molecule Inhibitors of Amyloid-
β Aggregation
Paper 6911
Donald F Cise*, J± (1), Ji-Huy Tang (2), Deborah Sabo-Ortiga (1), Chen-Shi Li (3), Ji-Gao Li (2), Sheila B. Stedman (2), Stanley P. Murphy (2), Min-Chyi Lin (2), Fang-Xin Ji (3), James Chapman (3), Sean Wang (3)
(1) University of Akron, Akron, OH
(2) University of South Carolina, Columbia, SC

Pd for Multiphase Reaction Mixtures
Paper 6911
Jesús Meléndez*, Gregory Lane, Mark Lindrud, Shrinivas Tummaru
Bristol-Myers Squibb Company, New Brunswick, NJ

Repeated Interactions Between ERβ1 Receptors and the Impact on Signal Initiation
Paper 6911
(1) University of New Mexico, Albuquerque, NM
(2) South Dakota State University, Brookings, SD
(3) West Virginia University, Morgantown, WV
(4) University of New Mexico, Albuquerque, NM

Discrete Element Modeling (DEM) Validation of Tablet Motion in a Vibratory Coating Pan
Paper 6911
Rehul Kumar*, Carl Westphalen
Purdue University, West Lafayette, IN

(602) Wednesday, Oct 31, 6:00 PM
Poster Session: Sustainability and Sustainable Biofinances
Convention Center, Hall B

Sigfrid C. Nilles, Chair
Iowa State University, Ames, IA
Susan M. Strong-Williams, Co-Chair
University of Kansas, Lawrence, KS

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Axial Dispersion in a Horizontally Rotating Scraped Surface Bioreactor
Paper 6902a
Mayasi Chortarian, R. Eric Benson*
University of Louisville, Louisville, KY

Algal De-Watering Using Temperature Sensitive Hydrogels: A Preliminary Step in the Harvesting Process
Paper 6902b
Apparao Venkatesan, Sridhar Nambiar, Satishwar Varanasi
University of Tulsa, Tulsa, OK

Situ Detection of Fermentative Activity by Redox Potential Measure and Its Applications During Ethanol Fermentation
Paper 6902c
Chen-Guang Liu
Dalian University of Technology, Dalian, China

CFD Modeling and Design of a Gravity Settler for Algal Harvesting
Paper 6902d
Karl Scott*, Scott Hugg, Juanne Stevich, Jorge E. Gelica
Cleveland State University, Cleveland, OH

Algal Genechipsing in an Open System and a Bioreactor
Paper 6902e
Alex C. Jemper*, Christa E. Nestlia
University of Arkansas, Fayetteville, AR

Enhancement of H2 and CO2 Uptake for the Production of Biodiesel in Ralstonia Eutropha
Paper 6902f
Pei-Chang Bao*, Ryan Sullivan, Camm Eckert, Jianjun Yu
National Renewable Energy Laboratory, Golden, CO

Biodiesel Production from Cynara Cardunculus: Economic, Environmental and Social Assessment
Paper 6902g
Carmen M. Torres, Sergio D. Ria, Cales Torres, Joan Sastre, Laureano Jimenez*
Universitat Rovira i Virgili, Tarragona, Spain

Reducing the Energy Consumption of Biofuel Production Using a Solar-Assisted Steam Generation System with Heat Storage
Paper 6902h
Robert Brennan*, Gonzalo Guehle, Javier Jimenez (7)
(1) Universitat Rovira i Virgili, Tarragona, Spain
(2) Universitat Politècnica de Catalunya, Barcelona, Spain

Biomas-Solvent Catalytic Reactions: Assessing Sugars and Intermediates by HPLC and GCMS
Paper 6902i
Saiju C. Nair*
Iowa State University, Ames, IA

High Pressure, Oxygen Blown Entrained-Flow Gasification of Bio-Oil
Paper 6902j
Nicholas Oregvar*, Robert C. Brown
Iowa State University, Ames, IA

Optimal CO2 Sequestration from Different Industrial Emissions to Yield an Algae-Based Biofuel
Paper 6902k
Ezequiel Rubio-Castro*, Joel Morales Ponce-Orozco, Ramiro G. Larrainaga, Mario A. Martinez
(1) Universidad de las Américas Puebla, Puebla, Mexico
(2) University of Missouri-Columbia, Columbia, MO
(3) Texas A&M University, College Station, TX

Production of the Recombinant Trichoderma Reesei Endoglucanase Protein Cel7B by Using the Kluyveromyces Lactis Yeast
Paper 6902l
Zahra Alizadeh*, Michael J. Broderick-Campbell, David N. Storliff
Michigan Technological University, Houghton, MI

Thermal-Catalytic Cracking of Lignin for Production of Value-Added Chemicals
Paper 6902m
Tan Huynh Kim*, Kang Seok No, Kang-Moon Lee (3)
(1) Kongju National University, Chungnam, South Korea
(2) Iowa State University, Ames, IA
(3) Korea Institute of Energy Research, Daejeon, South Korea

Potential Carbonal Condensation Reactions: Detoxification of Phenolic Model Compounds for Bioethanol Fermentation
Paper 6902n
Mecking Tr*, Xu Xia, Yuxin Wu
Auburn University, Auburn, AL

Medium and High Through-Put Characterization of Biofuel Feedstocks
Paper 6902o
(1) National Renewable Energy Laboratory, Golden, CO
(2) Bioenergy Sciences Center and Oak Ridge National Laboratory, Oak Ridge, TN

Comparison of Enzymatic Reactivity of Corn StoverSolids Prepared by Dilute Acid, APF and Ionic Liquid Pretreatments
Paper 6902p
Xiao Gao*, Gaye Kumar, Charles Byrnes
University of California, Riverside, Riverside, CA

Understanding How Cell Wall Differences in Agave, Poplar, and Switchgrass Affect Deconstruction in Pretreatment and Enzymatic Hydrolysis
Paper 6902q
Hongli Li*, Siddharth Prabhakar*, Marcin Piotrowski*, Rafael Camara (3), Sajjad Kumar (1), Arthur J. Ragauskas*, Michael G. Hahn (1), Charles E. Wyman (1)
(1) University of California, Riverside, Riverside, CA
(2) University of Georgia, Athens, GA
(3) Georgia Institute of Technology, Atlanta, GA

Bacteria Engineered for Bio-Synthetic Production
Paper 6902r
Relbehak McKenna, Steven Pugh, Warrinse Prudhsonzahra, David R. Neilson*
Arizona State University, Tempe, AZ
OPTIMAL DESIGN OF ALGAE-BASED BIOREFINERIES USING CO₂ FROM DIFFERENT INDUSTRIAL FACILITIES

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Abstract

This work proposes an optimization approach for the carbon dioxide sequestration from different industrial facilities to yield an algae-based biorefinery. The proposed approach is based on a distributed system to account for the economies of scale and it involves the site selection for the processing facilities as well as the transportation cost. Additionally, the model considers the optimization for the technologies used in each facility for the CO₂ sequestration, for the algae growth, harvesting, lipid extraction, and different technologies to yield several products like biodiesel, methane, ethanol, between others, depending on the customer demand. The proposed approach considers the mass exchange between different industrial facilities, because the algae from one plant can be used to produce products used in the same or in a different plant. The optimization model considers the maximization for the total net profit, which includes the sales of products plus the tax credit for reduction of CO₂ emissions minus the capital and operational costs for the different processing stages minus the overall transportation costs associated to the system. The constraints for the model include the mass balances for the system, design and operational constraints for the processing units and constraints for the demands for the products. The proposed model is a mixed integer non linear programming model and this was coded in the software GAMS. Finally, two case studies from Mexico were analyzed and the results show several economic and environmental benefits simultaneously.

Keywords: CO₂ sequestration, Optimization, Distributed system, Bio-refineries.