

Solar Topical

Topical Conference at the 2009 AIChE Annual Meeting

**Nashville, Tennessee, USA
8-13 November 2009**

ISBN: 978-1-61567-923-2

Printed from e-media with permission by:

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

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

Copyright© (2009) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2010)

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

AIChE
3 Park Avenue
New York, NY 10016-5991

Phone: (203) 702-7660
Fax: (203) 775-5177

www.aiche.org

TABLE OF CONTENTS

Shaping Our Energy Future: Advanced Research at the U.S. Department of Energy	1
<i>Jacques Beaudry-Losique</i>	
The Challenges of Scale and Sustainability in U.S. Energy Policy	2
<i>Marilyn Brown</i>	
The Nation's Renaissance in Energy Technology.....	3
<i>Dana C. Christensen</i>	
Clean Coal Technology and CO₂ Capture: A Perspective.....	4
<i>L.-S. Fan</i>	
Advanced Biofuels - The Path Forward.....	5
<i>W. Densmore Hunter</i>	
Electrical Characterization of Organic-Inorganic Hybrid Active Layer for Bulk Heterojunction Solar Cell	6
<i>Nguyen T. N. Truong, Chinho Park, Woo Kyoung Kim</i>	
Development of a Scalable Bottom-up Nanomanufacturing Platform for Highly Efficient Photovoltaics	7
<i>Chih-Hung Sun, Wei-Lun Min, Nicholas Linn, Tzung-Hua Lin, Bin Jiang, Peng Jiang</i>	
CIGS Nanocrystal Inks for the Fabrication of Air Stable Thin Film Solar Cells.....	8
<i>Qijie Guo, Hugh W. Hillhouse, Rakesh Agrawal</i>	
Low Temperature Processing of CIS Nanopowder for Flexible Substrates	9
<i>Rangarajan Krishnan, Umme Farva, Vaibhav Chaudhari, David Wood, Chinho Park, Andrew Payzant, Tim Anderson</i>	
Electronic Surface Properties of Polymer Electrode Materials for Polymer Photovoltaics	10
<i>David M. Huang, Daniela Dimitru LaGrange, Stephan Friedrich, Simon J. George, Adam J. Moule</i>	
Solar Cells with Graded Composition Absorber Layers Enabled by CIGS Nanocrystal-Based “Inks”	11
<i>Brian W. Goodfellow, Vahid A. Akhavan, Matthew G. Panthani, Brian A. Korgel</i>	
Synthetic Photoelectrochemical Complexes for Solar Energy Conversion That Self-Regenerate	12
<i>Michael Strano, Jong Hyun Choi, Moon-Ho Ham, Ardemis A. Boghossian, Esther S. Jeng, Rachel A. Graff, Daniel A. Heller, Alice C. Chang, Aidas Mattis, Timothy H. Bayburt, Yelena V. Grinkova, Adam Scott Zeiger, Krystyn J. Van Vliet, Erik K. Hobbie, Stephen G. Sligar, Colin A. Wright</i>	
Solar Fuels – Thermochemical Processes & Reactor Technology	14
<i>Aldo Steinfeld</i>	
Dynamic Model of a Solar Thermal Transport Tube Reactor for Control Purposes	15
<i>Elizabeth Saade, David E. Clough, Alan W. Weimer</i>	
CFD Modeling of a Multiple Tube Solar Aerosol Flow Reactor and Experimental Validation.....	16
<i>Janna Martinek, Paul Lichty, Carl Bingham, Alan W. Weimer</i>	
CO₂ Photo-Electro-Chemical-Conversion- Characterization of Copper/TiO₂.....	17
<i>Maria D. Salazar-Villalpando</i>	
Thermochemical Production of NH₃ Used for Fertilization	18
<i>Peter Pfromm, Ronald Michalsky</i>	
Solar Thermal H₂O Splitting Via Cobalt Ferrite Based Thermochemical Cycles.....	19
<i>Jonathan R. Scheffe, Anthony H. McDaniel, Mark D. Allendorf, Alan W. Weimer</i>	
High Density of Microalgae Culture Combined with CO₂ Separation Via Membrane-Based Gas Absorption Technology	21
<i>Muhammad Syukri Abd Rahaman, Lihua Cheng, Yatao Zhang, Lin Zhang, Huanlin Chen</i>	
Extremophilic Microalgae: Advanced Lipid Production for Biofuels.....	22
<i>Brent Peyton, Robert Gardner, Seth D'Imperio, Keith Cooksey, Matthew Fields</i>	
Effects of N and C Sources On Growth, Chlorophyll a, Lipid and CO₂ Biofixation for Chlorella Vulgaris	23
<i>Jianming Lv, Lihai Fan, Lihua Cheng, Huanlin Chen</i>	
Establishment of a Bioenergy-Focused Microalgal Strain Collection Using Rapid, High-Throughput Methodologies	24
<i>Al Darzins, Lee Elliott, Ryan Sestric, Matthew Posewitz</i>	
Growth Kinetic Study of Chlorella Vulgaris.....	25
<i>Jinsoo Kim, Joo-Youp Lee, Tim C. Keener</i>	
Algae Products for Biofuels: Isoprenoids	31
<i>Juergen Polle, D. Brogum, D. Tran</i>	

Effects of Two-Stage Semi-Continuous Culture and CO₂ Aeration On Cell Growth and Lipid Accumulation of <i>Nannochloropsis Oculata</i>	32
<i>Fang Zhang, Jianming Lu, Lihua Cheng, Lin Zhang, Huanlin Chen</i>	
Direct Monitoring of Oil Production in Individual Microalgae <i>in Situ</i> by Raman Spectroscopy	33
<i>Huawen Wu, Joanne Volponi, Seema Singh</i>	
Diurnal Cycling of Triacylglycerides in a Chlorophyte Sp.: Implications for the Production of Algal Biofuels	34
<i>Keith Cooksey, Robert M. Thomas</i>	
Physical and Nutrient Stresses for Stimulating Algal Biofuel Production: Quantitative Control of Fermentation.....	35
<i>Damian Carrieri, Gennady Ananyev, Dariya Momot, Ian Brasg, G.Charles Dismukes, Oliver Lenz, Oliver Lenz</i>	
Algal Feedstocks for Biogas Production: What Are We Waiting for?	36
<i>Mark B. Smith, Jun Cheng, Jun Cheng, Minghui Zhang, Damian Carrieri, Charles Dismukes</i>	
Author Index	