

American Institute of Chemical Engineers

Energy and Transport Processes

Presentations at the
2007 AIChE Annual Meeting

November 4-9, 2007
Salt Lake City, Utah, USA

Printed from e-media with permission by:

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

ISBN: 978-1-60560-005-5

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

ISBN: 978-1-60560-005-5

Copyright (2007) by the American Institute of Chemical Engineers.
All rights reserved.

For permission requests, please contact the American Institute of Chemical Engineers at the address below.

American Institute of Chemical Engineers
Proceedings
Three Park Avenue
New York, NY 10016-5991
Phone: 212-591-8100

www.aiche.org

American Institute of Chemical Engineers

Energy and Transport Processes

TABLE OF CONTENTS

Reaction Dynamics in a Parallel Flow Channel Pem Fuel Cell	1
<i>J. B. Benziger, E. Kimball, E. S. J. Chia, Y. G. Kevrekidis</i>	
Thermo-Mechanical Coupling in Particle Beds	2
<i>W. L. Vargas, J. J. McCarthy</i>	
Dissolution Behavior of Coated Microbubbles and Fluorescence Microscope of Glycerides Monolayer at Air/water Interface	3
<i>Y. Shen, R. L. Powell, M. L. Longo</i>	
Condensation of Organic Vapors on Finned Tubes.....	4
<i>S. Susarla, I. Rachamalla, S. Rachamalla</i>	
Multiscale Drying and Stress-Crack Formation in Corn Kernels.....	5
<i>P. S. Takhar, J. Hundal</i>	
Multiphase and Multicomponent Transport with Phase Change in Meat as Hygroscopic Porous Media.....	7
<i>A. Dhall, A. Halder, A. K. Datta</i>	
Cfd Simulation of Bubble Columns: Modeling of Non-Uniform Gas Distribution at Sparger.....	9
<i>M. R. Rampure, V. V. Ranade</i>	
Predicting Liquid-Solid Flow Regimes in Arbitrarily-Oriented Pipelines with Eulerian Multiphase Simulation.....	16
<i>L. Oshinowo, A. Agarwal, I. Vasquez, S. Vasquez</i>	
Simulation of Hydrate Dissociation in Porous Media in Cylindrical Coordinate.....	17
<i>Y. Liu, H. Arastoopour, M. Strumendo</i>	
Les/fdf Model for Turbulent Spray Combustion	18
<i>H. Koo, V. Raman</i>	
2D Numerical Simulation of Coal Gasifier for Hydrogen Product and in-Situ Fixation of CO₂.....	27
<i>L. Jing, Y. Liang, Z. Xiangping, Z. Suojiang, D. Wenbin</i>	
Cfd Application on Hydrodynamic Studies of a Multiphase Gas-Solids Flow in a Circulating Fluidized Bed Riser	37
<i>M. N. Idris</i>	
Erythrocyte Migration in a Flowing System Bounded by Particle-Free Fluids	47
<i>C. P. Aucoin, E. Leonard</i>	
Studies on Mass Transfer Using Co-Axial Orifice Turbulence Promoters	49
<i>S. R. Sangita, S. Vanapalli, R. P. Padamata, A. I. R. Chaduvula</i>	
Investigation of Electrostatic Charging Phenomenon in Multiphase Flows Using the Ecvt System	51
<i>Q. Marashdeh, W. Fei, A. H. A. Park, L. S. Fan</i>	
Augmentation of Apparent Diffusion Coefficient of Bovine Albumin and Urea by Increases in Red Blood Cell Concentration During Laminar Flow	56
<i>E. E. Nanne, C. P. Aucoin, E. Leonard</i>	

Analysis of Falling Particle in Solid Particle Solar Receiver	57
<i>B.R. Vijayarangan, S. F. Moujaes</i>	
Stability of Cationic Headgroups in Alkaline Anion-Exchange Membrane Fuel Cells.....	76
<i>S. Chempath, B. R. Einsla, J. M. Boncella, B. R. Pivoval, L. R. Pratt</i>	
Molecular Dynamics Simulations of Nanoscale Hydrophilic/hydrophobic Domain Structure in Hydrated Nafion	78
<i>C. K. Knox, M. K. Petersen, G. A. Voth</i>	
Reactive Molecular Dynamics Applied to Proton Transport in Fuel Cells.....	79
<i>M. E. Selvan, J. Liu, D. J. Keffer, B. J. Edwards, S. Cui, W. V. Steele</i>	
Method for Simulating Proton Transport.....	81
<i>C. M. Chang, D. Wheeler</i>	
Molecular Dynamics Simulations Of Lithium Transport In Bulk Electrolytes And At The Electrolyte/electrode Interface	82
<i>O. Borodin, G. D. Smith</i>	
Molecular Modeling of Anhydrous Polymeric Membranes for Fuel Cells.....	83
<i>S. J. Paddison</i>	
Characterization of Mediators Proposed to Better Facilitate Electron Transfer in Methanol Dehydrogenase Enzymatic Fuel Cells	84
<i>K. L. Keeton, D. S. Mainardi</i>	
Methanol Electro-Oxidation by Ion-Modified Methanol Dehydrogenase Enzymes.....	93
<i>N. B. Idupulapati, D. S. Mainardi</i>	
A First Principles Study of Direct Electrooxidation of Aqueous Borohydride on Au and Pt Surfaces	101
<i>M. Janik, G. Rostamikia</i>	
Modeling and Reduction of Carbon Dioxide Gas Formation at the Anode of a Direct Methanol Fuel Cell Using Chemically-Enhanced Solubility	102
<i>M. D. Lundin, M. J. McCready</i>	
Modeling of Liquid Water in Pem (Proton Exchange Membrane) Fuel Cell.....	103
<i>U. Nallasivam, D. Bhattacharyya, R. Rengaswamy, R. M. Rao</i>	
Oscillatory Flow in the Direct Methanol Fuel Cell: Effects on Mass Transfer, Bubble Management, and Cell Performance.....	104
<i>P. P. Schonewill, D. T. Leighton Jr.,</i>	
A Steady State Three-Dimensional Model for a Pemfc System	107
<i>A. Pandy, A. Raghunathan, S. Varigonda, N. Gupta, A. T. Haug</i>	
Methanol Transport in a Passive Dmfc Employing a Porous Carbon Plate	108
<i>M. A. Abdelkareem, N. Nakagawa</i>	
Validation of Les Based Predictions of Heat Flux to Objects in Transportation Fuel Fires	109
<i>J. Spinti, P. J. Smith, J. N. Thornock, S. Borodai</i>	
Heat and Mass Transport in a Reactive Porous Medium: Application to Heavy Oil and Oil Shales Combustion	110
<i>A. Lapene, B. Debenest, M. Quintard, M. F. Martins, S. Salvador</i>	
Application of Adsorption in Refrigeration by Sulfurized Activated Carbon	120
<i>Y. Pliego-Bravo, J. Montaño-Águila, E. Bolaños-Reynoso</i>	

Numeric Simulation of Radiation Chamber in Furnaces	121
<i>E. V. R. Mendes, N. Fico Jr., C. E. F. Silva, V. C. de Souza, P. C. dos Santos</i>	
Thermal Analysis of Agricultural Wastes Used for Energy Production.....	130
<i>E. Cserta, H. Raupenstrauch, E. Mészáros, M. Poppenwimmer, P. Tóvári</i>	
Author Index	