

Nuclear Engineering Division 2015

Core Programming Area at the 2015 AIChE Annual Meeting

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

ISBN: 978-1-5108-1868-2

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

(120b) Metal-Ferrocyanide Functionalized Magnetic Adsorbents for the Removal of Radioactive Cesium in Contaminated Water	1
<i>Hee-Man Yang, Sang Bum Hong, Chan Woo Park, Kune Woo Lee, Bum-Kyoung Seo, Jei-Kwon Moon</i>	
(120c) Confined Swelling Pressure Tests for Spherical Resorcinol-Formaldehyde Resin	2
<i>Paul A. Taylor, Joseph Walker, Trenton Walker</i>	
(120d) Analysis of Mobile Helium Cluster Reactions Near Surfaces and Grain Boundaries of Plasma-Exposed Tungsten	3
<i>Lin Hu, Karl D. Hammond, Brian D. Wirth, Dimitrios Maroudas</i>	
(128a) High Operating Temperature Transfer and Storage (HOTTs) System for Concentrated Solar Power Generation and Industrial Heat Integration	4
<i>Christopher Bonino, Bruce Cook, Josh Hlebak, Nicolas Baldasaro, Richard Gould</i>	
(128b) Discrete Element and Continuum Heat Transfer Simulations of a Solar Receiver That Uses Solid Particles As a Heat Transfer Fluid	5
<i>Aaron Morris, Zhiwen Ma, Sreekanth Pannala, Christine M. Hrenya</i>	
(128c) Topology Optimisation for Optimal Shape Selection of Solar Parabolic Trough Receiver	19
<i>Simon Ocheme</i>	
(128d) Design of Solar Thermophotovoltaic Power Generators Using a Genetic Algorithm	20
<i>John DeSutter, Michael Bernardi, Mathieu Francoeur</i>	
(128e) Near-Field Enhanced Thermionic Energy Conversion for Concentrated Photovoltaic Power Generation	25
<i>Mohammad Ghashami, Keunhan Park</i>	
(128f) A Parallel, Open Source, Grey Body Monte Carlo Ray Tracer with Graphical User Interface for Solar Simulator Characterization	29
<i>Scott C. Rowe, Illias Hischier, David E. Clough, Alan W. Weimer</i>	
(182a) Study of Plenum to Plenum (P2P) Natural Circulation Phenomena in a Dual Channel Scaled Module of Very High Temperature Reactor Design By Using CFD	30
<i>M.M. Kao, P. Jain, I.a. Said, M.M. Taha, S. Usman, Muthanna M. Aldahhan, Rizwan Uddin</i>	
(182b) Comprehensive Thermodynamic Model for Aqueous Nitric Acid and Sodium Nitrate Solution with Electrolyte NRTL Equation	44
<i>Maximilian B. Gorensiek, Dan P. Lambert, Meng Wang, Chau-Chyun Chen</i>	
(182c) A Toolkit Approach for Simulation of Nuclear Facilities	45
<i>Valmor F. de Almeida</i>	
(182d) Microsecond-Length Atomistic Simulations of Plasma-Facing Materials	46
<i>Karl D. Hammond, Lin Hu, Dimitrios Maroudas, Brian D. Wirth</i>	
(182e) Benchmarking of Heep with G4-Econs Program for Nuclear Hydrogen Production Plant	47
<i>Jong-Ho Kim, Ki-Young Lee, Min-Hwan KIM</i>	
(200a) Efficiency and Design of High-Temperature Solar-Thermal Reactors	48
<i>Arto J. Groehn, Allan Lewandowski, Ronggui Yang, Alan W. Weimer</i>	
(200b) Impact of Reduction of Flowing Particles on System Efficiency for Solar Thermochemical Hydrogen Production	49
<i>Brian D. Ehrhart, Christopher L. Muhich, Ibraheam Al-Shankiti, Barbara J. Ward, Alan W. Weimer</i>	
(200c) Measurement of Oxygen Release from Redox Samples for Solar Fuel Production	50
<i>Justin L. Lapp, Rene Rieping, Martin Roeb, Christian Sattler</i>	
(200d) CO₂ Reforming of CH₄ with an Isothermal Redox Membrane Reactor	51
<i>Ronald Michalsky, Dominique Neuhaus, Aldo Steinfeld</i>	
(200e) Solar Thermochemical CO₂ Capture Via Calcium Oxide Looping: Thermal Transport Modeling and Solar Reactor Design	52
<i>Lindsey Yue, Leanne Reich, Terrence Simon, Roman Bader, Wojciech Lipinski</i>	
(200f) Carbonation Kinetics of SrO By CO₂ for Solar Thermochemical Energy Storage	53
<i>Elham Bagherisreshki, Justin Tran, Chen Chen, Like Li, Nick AuYeung</i>	
(200g) A Novel Reduced Pressure Hybrid Solar/Electric Reactor for Producing Magnesium Metal Via Carbothermal Reduction	54
<i>Illias Hischier, Aaron W. Palumbo, Boris Chubukov, Scott C. Rowe, Arto J. Groehn, Richard P. Fisher, Allan Lewandowski, Alan W. Weimer</i>	
(280a) Developments in the Integrated Flowsheet for Treating Hanford's Radioactive and Hazardous Liquid Waste	55
<i>Stuart T. Arm, Renee Spires, Julie Colby, Rose Russell, Vinh Nguyen</i>	

(280b) Electrochemical Recovery of Fission Platinoids in 1-Butyl-1methylpyrrolidinium Dicyanamide Ionic Liquid.....	64
<i>Sujan Shrestha, Miyan Nagib, Elizabeth J. Biddinger</i>	
(280c) Electroytic Reduction of Zirconium Oxide in Molten LiCl-Li₂O to Study Mass Transport of Li₂O	65
<i>Adam Burak, Michael Simpson</i>	
(280d) Adsorption of Radioactive I₂ and Tritiated Water from Spent Fuel Reprocessing Off-Gases By Reduced Silver Mordenite.....	66
<i>Yue Nan, David W. DePaoli, Lawrence L. Taylarides</i>	
(359a) Mixing Nuclear Waste Using Airlift Circulators: Performance Measurements and Parameter Optimization	78
<i>Philip P. Schonewill, Eric J. Berglin, Greg K. Boeringa, William C. Buchmiller, Carolyn A. Burns, Michael J. Minette, Donald H. Alexander, Langdon K. Holton</i>	
(359b) Experimental and Computational Investigations of Plenum-to-Plenum Heat Transfer and Gas Dynamics Under Natural Circulation in a Prismatic Very High Temperature Reactor	97
<i>I. a. Said, M. M. Taha, S. Usman, Muthanna H. Al-Dahhan</i>	
(359c) Is Thorium a Non Starter in Rare Earth Minerals Recovery?	108
<i>Don Phillips</i>	
(389a) Coproduction of Chemicals: Improving the Value Proposition of Nuclear Power.....	119
<i>Eric W. McFarland, Diego Schmeda-Lopez, Tom McConaughy, Howard Fong, Phil Grosso</i>	
(389b) Development of Activity Coefficient Model for La(III) in LiCl-KCl Eutectic Salt.....	120
<i>Prashant Bagri, Michael Simpson</i>	
(389c) Salt-Bismuth Extraction Pyroprocessing for Molten Salt Thorium Fueled Reactors.....	132
<i>Milan Stika, Michael Simpson</i>	
(389d) Measurement of Electrochemical Transport Properties of Manganese Ions in Eutectic LiCl-KCl Using High Temperature Voltammetry	141
<i>David Horvath</i>	
(389e) A Combined Microstructural and Chemical Study of Uranium in Unconventional Shale Reservoirs.....	142
<i>Joseph Levinthal</i>	
(528a) Evaporation Tests Using Redc Lllw Simulant Solutions.....	143
<i>Paul A. Taylor</i>	
(528b) Aspen/Oli Model of Waste Evaporation and Neutralization Process for Mox Waste Solidification Building	144
<i>James E. Laurinat</i>	
(528c) Small Scale Testing of a Floating Ion Exchange Bed for Nuclear Waste Treatment	154
<i>Charles A. Nash, M. R. Williams</i>	
(528d) Characterization of the Next Generation Solvent Used to Remove Cesium at the Savannah River Site	155
<i>Fernando Fondev</i>	
(528e) Innovative Idea to Accelerate Tank Closure in Doe Savannah River Site	156
<i>Robert C.W. Chang, Peter Hill, Aaron Staub</i>	
(585a) Prediction of Radiolytic Benzene Generation in a Waste Tank at the Savannah River Site	166
<i>Thong Hang, Thomas B. Peters</i>	
(585b) Pilot-Scale Filter Testing of a Process to Treat Radioactive Liquid Waste	167
<i>Michael Poirier, P. R. Burkett</i>	
(585c) Preparation of Geopolymers from Wastes	168
<i>Miyuki Noguchi, Motoki Inoue, Akihiro Yamasaki</i>	
(585d) Technical Bases for the DWPF Melter Off-gas Flammability Control under the Glycolic-Acid Flowsheet	169
<i>Alexander S. Choi, John R. Zamecnik, Fabienne Johnson</i>	
(585e) A Better Understanding for Cold-Cap Reactions of Nuclear Waste Feeds through Quantitative Evolved Gas Analysis	185
<i>Jaehun Chun, Carmen Rodriguez, Michael Schweiger, Albert A. Kruger, Pavel Hrma</i>	
Author Index	