Nuclear Engineering Division 2016

Core Programming Area at the 2016 AIChE Annual Meeting

San Francisco, California, USA
13 - 18 November 2016

ISBN: 978-1-5108-3443-9

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© (2016) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2017)

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: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

(110a) Overview of U.S. DOE Environmental and Waste Cleanup Programs 1
Ken Picha
(191a) Perspectives on Chemical Engineering Research in the Nuclear Fuel Cycle 2
Jack D. Law
(250a) Predicting Chromatographic Separations of Lanthanide Chelates for Nuclear Forensics 3
Shayan Shahbazi
(250b) Preparation of Surrogate Post-Detonation Debris Using a Plasma Torch 4
Paul A. Taylor, Alexander Braatz, Andrew Giminaro
(250c) Experimental Analysis of Plutonium Product and Raffinate Streams from Multiple Purex Process on a Low Burn-up, Fast Neutron Irradiated DUO2 Pellet 5
Jarrod Allred
(250d) A Mechanistic Interpretation of Activity Pick-up Data 6
James T. Orr
(264a) Engineering Challenges in the Development of Actinide/Lanthanide Separation Processes to Support Advanced Nuclear Fuel Reprocessing 20
Jack D. Law, Bruce J. Mincher, Nicholas Schmitt, Troy G. Garn, Richard Tillotson
(264b) Extraction Kinetics and Hydrodynamics in Miniature Annular Centrifugal Contactors 21
Tro Babikian, Mikael Nilsson
(264c) Lab-Scale Tests of Codecontamination Processing 22
Candido Pereira, Cari Launiere, John F. Krebs
(264d) In-Line Near Real Time Monitoring of Fluid Streams in Separation Processes for Used Nuclear Fuel 23
Mikael Nilsson, Ko Nee
(264e) Adsorption Process Modeling for the Recovery of Uranium from Seawater 24
Austin Ladshaw, Sotira Yiacoumi, Costas Tsouris
(264f) First-Principles Based Computational Study on Nucleation and Growth Mechanisms of U on Mo(110) Surface Solvated in an Eutectic Licl–KCl Molten Salt 25
Choa Kwon, Byungchan Han
(327a) How Department of Energy - Environmental Management Stores, Treats and Disposes of Radiological and Mixed Hazardous Wastes at the Savannah River Site 26
Michael Mikolanis, Pauline Hang
(327b) Implementation of Flowsheet Change to Minimize Hydrogen and Ammonia Generation during Chemical Processing of High Level Waste in the Defense Waste Processing Facility 27
Dan P. Lambert, J. R. Zamecnik, Wesley H. Woodham
(327c) Melter Feed Viscosity during Conversion to Glass: Comparison Between Low-Activity and High-Level Nuclear Waste Feeds 38
Jaehun Chun, Tongan Jin, Dongsang Kim, Jarrod Crum, Charles Bonham, Bradley VanderVeer, Derek Dixon, Carmen Rodriguez, Brigitte Weese, Michael Schweiger, Albert A. Kruger, Pavel Hrma
(327d) Crossflow Filtration of Waste Simulants in Support of the Low Activity Waste Pretreatment System 39
Philip P. Schonewill, Richard C. Daniel, Carolyn A. Burns, Ernest J. Antonio
(327e) Challenges and Effective Methods for Implementing Full ASME Nqa-1 2008, 2009 Requirements on the Biggest, First-of-a-Kind Nuclear Projects. 40
Kyle Kilroy, John Olson
(327f) Co-Adsorption of Iodine and Water By Reduced Silver-Exchanged Mordenite 41
Yue Nan, Austin Ladshaw, Sotira Yiacoumi, Costas Tsouris, David W. DePaoli, Lawrence L. Tavlarides
(389b) Renuclear: Use of a Molten Salt Breeder Reactor for Nuclear Reactor Decomissioning and Spent Fuel Disposal 49
Thomas P. Nigl, Daniel Kelly, David Hurt, Christopher Puzzo, George Winter
(389c) Analysis of Mobile Helium Cluster Dynamics Near Surfaces and Grain Boundaries of Plasma-Exposed Tungsten 50
Lin Hu, Karl D. Hammond, Brian D. Wirth, Dimitrios Maroudas
(389d) Experimental Investigation of the Pebbles Residence Time in a Pebble Bed Reactor (PBR) Using Residence Time Distribution (RTD) Technique 51
Vaibhav Khane, M. M. Taha, Muthanna Al-Dahhan
(389e) Screening of Polymeric Materials for Tritiated Water Separation By Molecular Simulations 52
Abhishek Bagusetty, J. Karl Johnson

(457b) Comparison Between the OLI-MSE and eNRTL Models in Predicting Thermodynamic Properties of the NaNO3-HNO3-H2O Ternary System 53
Meng Wang, Maximilian B. Gorensek, Chau-Chyun Chen
(457c) Multi-Agent Optimization Framework (MAOP) for Synthesizing Optimal Radioactive Waste Blends 54
Berhane Gebreslassie, Urmila M. Diwekar
(457d) Thermodynamics Analysis and Optimization of a Stirling Cycle for Lunar Surface Nuclear Power System 55
Senqing Fan, Minghai Li
(457e) Simulation of Helium Transport Near Prismatic Dislocation Loops in Tungsten 56
Francesco Ferroni, Karl D. Hammond, Brian D. Wirth
(457f) Atomistic and Continuum Drift-Diffusion Simulations of Helium Transport in Tungsten 57
Karl D. Hammond, Ian V. Naeger, Lin Hu, Sophie Blondel, Brian D. Wirth, Dimitrios Maroudas, David E. Bernholdt
(528a) Density Functional Theory Study of the Hydrolysis of a Sodium Borosilicate Glass 58
Denise C. Ford, Haiying He, Peter Zapol
(528b) Pore Saturation Model for Capillary Imbibition and Drainage Pressures 59
James E. Laurinat
(528c) Technetium Leaching Cementitious Materials 74
J.C. Seaman, S.P. Simner, H.S. Chang, F. Coutelot
(528d) Remediation of Uranium-Contaminated Groundwater By Functionalized Magnetic Mesoporous Silica Nanoparticles 75
Dien Li, Shani Egodawatte, Dan Kaplan, Steven Serkiz, Sarah Larsen, John Seaman, Kirk Scheckel
(528e) Kinetics of Simultaneous Transformation of Co-Existing Mixed Contaminant Media of Cr(VI) and TCE Using Nanoscale Zero Valent Iron (nZVI) 76
Daniel Attoh, Aadarsh Shah, Ramesh Chawla
(528f) Numerical Simulation and Optimization of Environmental Treatment Design Using Parallel Computational Methods: Theory and Application 77
Larry M. Deschaine
(559b) The Reaction Rate of Uranium-Aluminum Alloys in Boiling Caustic Solutions 81
Mark Swientoniewski, W.P. Huxtable, Brian R. Fant
(559c) Anode Material Studies for Electrowinning Li2O in Molten LiCl 98
Michael Simpson, Mario Gonzalez
(559d) Route to Separation of Actinide Metals from Rare Earth Metals Via Conversion to Chlorides 99
Parker Okabe, Devin Rappleye, Michael Simpson
(559e) A High-Throughput Investigation of Fe-Cr-Al As a Novel High-Temperature Coating for Nuclear Cladding Applications 100
Jonathan Kenneth Bunn, Randy Fang, Mark Albing, Apurva Mehta, Matthew J Kramer, Matthew Besser, Jason Hattrick-Simpers
(559f) Development of a Rotating Cylinder Electrode for Electroanalytical Measurements in a Used Nuclear Fuel Electrorefiner 101
Devin Rappleye, Michael Simpson
Author Index