AIChE 2005

Spring National Meeting & Global Congress on Process Safety

Preliminary Technical Program

Featuring New!

8 tracks packed with the focused information chemical engineers need to succeed

- Global Congress on Process Safety
- Ethylene Producers Conference
- Fuels, Petrochemicals and Refining
- Sustaining the Manufacturing Base
- Tools for Commercial Success
- Profitable Paths for New Process Technology
- Enabling Energy Strategies
- Applying Core Competencies to 21st Century Problems

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- ***20th CCPS International Conference***
- ***39th Loss Prevention Symposium***
- ***2005 Process Plant Safety Symposium***

05 AIChE Spring National Meeting Atlanta, GA

Hyatt Regency * Atlanta, Georgia * April 10-14, 2005

The following is the preliminary technical program and is subject to change.
For the latest program, visit www.aiche.org/conferences/techprogram/browse.asp?DSN=spring

[1] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Inman

Intensified Reactor Technology with Heat and Mass Transfer Enhancement Techniques

Roshan Jachuck, *Chair*
Clarkson University
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers
Sponsored by
Process Intensification and Clean Technology

The Crucible for Differential Scanning Calorimetry as a Microreactor for the Investigation of Oxidation Reactions and Hydrogenations • 8:30 AM • paper 1a • Pierre Reuse*, Swiss Safety Institute

Hydrodynamic Cavitation: A Process Intensification Technology For The Future • 9:00 AM • paper 1b • Girish V. Ambulgekar, Aniruddha B. Pandit, Parag R. Gogate*, Institute of Chemical Technology, University of Mumbai

Heat Transfer Enhancement and Fouling Rate Reduction in Chemical Industry Process Heaters Through Dimpling of the Product Tubes • 9:30 AM • paper 1c • Yaroslav Chudnovsky, Aleksandr Kozlov, Gas Technology Institute

Discussion Session • 10:00 AM • paper 1d • Roshan Jachuck*, Clarkson University

[2] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Inman

Bio and Process Intensification via Innovative Chemistry

Roshan Jachuck, *Chair*
Clarkson University
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers
Sponsored by
Process Intensification and Clean Technology

Intensified Liquid Phase Reactions in Tethered Catalyst Microchannel Reactors • 2:00 PM • paper 2a • John Brophy, Kai Jarosch*, Velocys, Inc.

Gold Catalyzed Cyclohexane Oxidation • 2:30 PM • paper 2b • Mikhail I Khramov*, Solutia

Catalytic Reactions for the Production of Biomarkers from the Biological Warfare Agent Anthrax • 3:00 PM • paper 2c • Aaron N. Nackos, Edgar D. Lee, Calvin H. Bartholomew, Zhijun Jia*, Phillip R. Smith, Milton L. Lee, Brigham Young University

Discussion Session • 3:30 PM • paper 2d • Roshan Jachuck*, Clarkson University

[3] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Inman

Novel Separation Technology

Roshan Jachuck, *Chair*
Clarkson University
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers
Sponsored by
Process Intensification and Clean Technology

Keynote Address on Novel Separation Technology • 8:30 AM • paper 3a • Lawrence Weatherly*, University of Kansas

Removal of Heavy Metal Ions by Magnetically Modified Zeolite • 9:00 AM • paper 3b • Jae Ho Kwak, Div. Chem.Eng. Hanyang University, Choong Jeon, Kyung-Yub Hwang, In Wook Nah*, Korea Institute of Science and Technology

A Novel, Highly Efficient and Economic Purification Process Revolutionizing PTA Production • 9:30 AM • paper 3c • Ron Gualy, Tai-Li Chou, Randi Wytcherley*, Costantino Braggiato, GTC Technology Inc.

Production of Magnetic Beads for Bio-separation – Process Scale-up • 10:00 AM • paper 3d • Urs A Peuker*, Tobias Banert, ICVT-TU Clausthal

Discussion Session • 10:30 AM • paper 3e • Roshan Jachuck*, Clarkson University

[4] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Inman

Microreaction Technology

Roshan Jachuck, *Chair*
Clarkson University
Sponsored by
Process Intensification and Clean Technology

Microreactor Keynote Address • 2:05 PM • paper 4a • W. Asterios*, University College London

High Throughput Screening of Low Temperature CO Oxidation and VOC Combustion Catalysts • 2:35 PM • paper 4b • H. Sam Bergh, W. Henry Weinberg, Guido Streukens, Valery Sokolovskii, Andreas Lesik, Alfred Hagemeyer, Stephen H. Cypes*, Zachary Hogan, Symyx Technologies, Inc.

Production of Hydrogen Peroxide by Controlled H_2/O_2 Reaction in a Microchannel Reactor • 3:05 PM • paper 4c • Adeniyi Lawal*, Yury Voloshin, Sunitha Tadepalli, Raghunath Halder, Woo Lee, NJCMCS, Stevens Institute of Technology, Emmanuel Dada, FMC Corp.

Microchannel Reactor System for Catalytic Hydrogenation of *o*-nitroanisole to *o*-anisidine • 3:35 PM • paper 4d • Adeniyi Lawal*, Sunitha Tadepalli, Raghunath Halder, Woo Lee, Ronald S Besser, NJCMCS, Stevens Institute of Technology, Donald Kientzler, Bristol-Myers Squibb Co., Luke Achenie, ChemProcess Technologies

Olefins by High Intensity Oxidation of Ethane • 4:05 PM • paper 4e • Terry Mazanec*, Velocys, Inc.

The Use of Solid-Supported Reagents within Microfabricated Devices • 4:35 PM • paper 4f • Charlotte Wiles*, The University of Hull

Discussion Session • 5:05 PM • paper 4g • Roshan Jajuck*, Clarkson University

[5] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, Vinings

Discussion on Way Forward

Roshan Jachuck, *Chair*
Clarkson University
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers
Sponsored by
Process Intensification and Clean Technology

Discussion Group • 8:30 AM • paper 5a • Roshan Jachuck*, Clarkson University

[8] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Fairlie

Green Processing and Manufacturing

Chad Nelson, *Chair*
University of Massachusetts
Joseph Kocal, *Vice-Chair*
UOP
Sponsored by **Sustainability and Green Engineering: Coming of Age**

Zeolite Membranes for Xylene Separations • 8:15 AM • paper 8a • Tina M Nenoff*, Mutlu Kartin, Sandia National Laboratories, Olubunmi Ogunsola, TEMEC, Junhang Dong, New Mexico Tech University

New Sustainable Chemistries for Low VOC Coatings • 8:55 AM • paper 8b • Paul Bloom, Archer Daniels Midland Co.,James K. Bardman, Anne Koller, Andrew Swartz*, Rohm and Haas Co.

Conversion of Waste Hydrochloric Acid Back to Chlorine Gas for Recycling in Manufacture of Titanium Dioxide Pigments • 9:40 AM • paper 8c • Jeannine E. Elliott*, Robert J. Copeland, Yevgenia Gershanovich, TDA Research, Inc.

Novel Fixed-Bed Reactor for Solid-Acid Catalyzed Iso-Paraffin Alkylation • 10:20 AM • paper 8d • Mitrajit Mukherjee*, Sankaran Sundaresan, Exelus Inc.

[9] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Edgewood

Management Review of HSE to Assure Business Sustainability

Susan Lallier Smith, *Chair*
Shell Lubricants North America
Sponsored by **Sustainability and Green Engineering: Coming of Age**

Beyond the Code of Conduct — How Senior Management Reviews of HSE Can Add Sustainable Value Through Risk Reduction and Improved Stakeholder Perceptions • 2:10 PM • paper 9a • Susan Fernandez*, URS Corp.

Assurance and Risk Management: Developing and Monitoring HSE Indicators Towards Sustainability • 2:40 PM • paper 9b • Luiz Guimaraes*, URS Corp.

Sustainability Reporting — Mitigation of Legal Risk through Effective Management Review • 3:10 PM • paper 9c • Katherine N Blue*, Trinity Consultants

Environmental Management Systems: From Burden to Opportunity • 3:40 PM • paper 9d • Brian Kraus*, ERM CVS

[10] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Fairlie

Green Process Design

Chad Nelson, *Chair*
University of Massachusetts
Joseph Kocal, *Vice-Chair*
UOP
Sponsored by **Sustainability and Green Engineering: Coming of Age**

Using Fenton Chemistry for Wastewater Treatment of Organic Recalcitrant Sub-

Please note: An asterisk (*) indicates the speaker. 05

stances • 2:05 PM • paper 10a • Abel Mondelo Rodriguez*, LABIOFAM, Jose Maria Ameneiros Martinez, Eduardo Marquez Canosa, Higher Politechnics Institute José A. Echeverría ISPJAE - CUJAE

Green PX Processes that Use Waste Heat Powered Ammonia Absorption Refrigeration • 2:45 PM • paper 10b • Jeffrey A. Amelse*, Philip L. Jackson, BP Amoco Chemical Co., K. D. Ganesan, A. Cato, Fluor Enterprises, Donald Erickson, E. Makar, C. B. Panchal, G. Anand, Energy Concepts Co.

Process Simulation as a Tool for Green Processing: Simulation of Synthetic Zeolites-4A and 5A Manufacturing • 3:25 PM • paper 10c • Jian Zhang*, Ihab H. Farag, University of New Hampshire

[11] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Fairlie

Adding Benefits to Cost Assessments

Lise Laurin, *Chair*
EarthShift
Melissa Hamilton, *Vice-Chair*
EarthShift

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Total Cost Assessment — A Brief History • 8:45 AM • paper 11a • Gregory Norris*, Sylvatica

Taking the Mystery Out of Total Cost Assessment • 9:15 AM • paper 11b • Lise Laurin*, EarthShift

Adding Benefits to Cost Assessment: A More Balanced Tool • 10:05 AM • paper 11c • Earl Beaver*, Practical Sustainability, LLC

Discussion on Adding Benefits to Total Cost Approaches • 10:55 AM • paper 11d • Melissa Hamilton*, EarthShift

[12] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Edgewood

Universities and Sustainability

Robert Hesketh, *Chair*
Rowan University
Jorge Vanegas, *Vice-Chair*
Georgia Institute of Technology

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Integrating Green Engineering into Chemical Engineering Courses • 8:35 AM • paper 12a • Jim Henry*, UT-Chattanooga, Robert Hesketh, Rowan University

Green Engineering Design in a Senior Course on Safety • 8:55 AM • paper 12b • David Shonnard*, Michigan Technological University

The South Carolina Sustainable Universities Initiative and Its Impact at the University of South Carolina • 9:15 AM • paper 12c • Francis A. Gadala-Maria*, University of South Carolina

Graduate Programs Prepare Students for Careers in Sustainability • 9:35 AM • paper 12d • Vanessa C. Cobb*, Alexandra Sullivan, Columbia University

Graduate Programs in Sustainability • 9:55 AM • paper 12e • Ku-Yen Li*, Helen H. Lou, John L. Gossage, Lamar University

Sustainability Beyond the Classroom: The Georgia Tech Experience • 10:15 AM • paper 12f • Jorge Vanegas*, Georgia Institute of Technology

Energy and Sustainability Institute at Illinois Institute of Technology (IIT) • 10:35 AM • paper 12g • Hamid Arastoopour*, Henry R. Linden, Illinois Institute of Technology

Sustainability Through a Transversal Environmental Agenda at UASLP • 10:55 AM • paper 12h • Luz-María Nieto-Caraveo, Pedro Medellín-Milán*, Universidad Autónoma de San Luis Potosí

[13] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Edgewood

Management System Effectiveness

Bob Murray, *Chair*
Webb, Murray & Associates, Inc.
Bob Brennecke, *Vice-Chair*
Webb, Murray & Associates, Inc.

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Management System Effectiveness — Performance Driven Management of Health, Safety and Environmental • 2:10 PM • paper 13a • John A. Matt*, Shell Lubricants

PSM/RMP Audits: Compliance vs. Effectiveness • 2:55 PM • paper 13b • Charles W Foshee*, Webb, Murray & Associates, Inc.

HSE Performance through Lyondell's Operational Excellence Process • 3:40 PM • paper 13c • Greg Plate*, Lyondell

[14] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Fairlie

Building the Business Case for Sustainability: Panel Discussion

Beth Beloff, *Chair*
BRIDGES to Sustainability

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Panel Introduction • 2:00 PM • paper 14a • Beth Beloff*, BRIDGES to Sustainability

Comments by Keith Miller, 3M (invited) • 2:10 PM • paper 14b • Keith Miller*, 3M

Comments by Dawn Rittenhaus, DuPont (invited) • 2:15 PM • paper 14c • Dawn Rittenhouse*, DuPont

Comments by Corinna Funk, Mass Tech Collaborative • 2:20 PM • paper 14d • Corinna Funk*, Mass Tech Collaborative

Comments by Johan Breukelaar, Shell Chemicals Europe • 2:25 PM • paper 14e • Johan Breukelaar*, Shell Chemicals Europe BU

Comments by Frank Dickson, Innovest • 2:30 PM • paper 14f • Frank Dickson*, Innovest

Questions to the Panel • 2:35 PM • paper 14g • Beth Beloff*, BRIDGES to Sustainability

[15] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Edgewood

Lifecycle Assessment of Business

Earl Beaver, *Chair*
Practical Sustainability, LLC
Thomas Marrero, *Vice-Chair*
University of Missouri-Columbia

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Use of Eco-Efficiency Tool • 8:50 AM • paper 15a • Charlene A. Wall*, BASF Corp.

Incorporating Decision Support Tools in Green Engineering • 9:10 AM • paper 15b • John Carberry*, DuPont Experimental Station

Life Cycle Assessments Used in Decision Making • 9:30 AM • paper 15c • Brian Glazebrook*, First Environment, Inc.

Panel Discussion on Lifecycle Assessment of Business • 9:50 AM • paper 15d • Earl Beaver*, Practical Sustainability, LLC

[16] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Fairlie

Audit Practices to Assure Sustainability of Your Business

Rebecca Pehler, *Chair*
Webb, Murray & Associates, Inc.

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Importance of Audit Practices to Measure Sustainability • 8:50 AM • paper 16a • William Russell*, SKN

Management Review of HSE: How to Assure that Audit Findings Are Included • 9:20 AM • paper 16b • Rebecca C. Pehler*, Webb, Murray & Associates, Inc.

Panel Review of Audit Practice Tools — Sustainability • 9:50 AM • paper 16c • Webb, Murray & Associates, Inc.

[17] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Fairlie

Sustainability Panel Discussion

Earl Beaver, *Chair*
Practical Sustainability, LLC
Richard Smith, *Vice-Chair*
Texas Commission on Environmental Quality

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Comments from Center for Sustainable Technology Practices • 2:20 PM • paper 17a • Charlene A Wall*, BASF Corp.

Shell Chemical and Sustainability • 2:40 PM • paper 17b • Johan Breukelaar*, Shell Chemicals Europe BU

US EPA and Sustainability • 3:00 PM • paper 17c • Heriberto Cabezas*, U.S. EPA

Comments from Glaxo Smith Kline • 3:20 PM • paper 17d • David Constable*, GlaxoSmithKline

Panel Discussion • 3:40 PM • paper 17e • Thomas Marrero*, University of Missouri-Columbia

[18] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, Edgewood

Sustainability of the Business Lifecycle

Charlene A. Wall, *Chair*
BASF Corp.

Sponsored by **Sustainability and Green Engineering: Coming of Age**

DJSI Leaders Demonstration of Commitment to Sustainability • 8:40 AM • paper 18a • David R. Taschler*, Air Products and Chemicals, Inc.

How BASF Achieves Leadership in Sustainability • 9:25 AM • paper 18b • Charlene A. Wall*, BASF Corp.

Discussion of Corporations • 10:10 AM • paper 18c • BASF Corp., David R. Taschler, Air Products and Chemicals, Inc.

[19] Thursday, April 14, 2:00 PM Hyatt Regency Atlanta, Edgewood

Sustainability: Thinking Green Through the Eyes of Your Customers

Lyn Beary, *Chair*
National Institute of Standards and Technology, Chemical Science and Technology Labs

Sponsored by **Sustainability and Green Engineering: Coming of Age**

Welcome and Session Overview • 2:00 PM • paper 19a • Lyn Beary*, National Institute of Standards and Technology, Chemical Science and Technology Labs

Comments from Fibers Sector • 2:15 PM • paper 19b • Dave H. Gustashaw*, Interface

Comments from the Metals Sector • 2:45 PM • paper 19c • Vince Van Son*, Alcoa

Comments from the Food and Nutrition Sector • 3:15 PM • paper 19d • Kraft, Inc.

Comments from the Pulp and Paper Industry • 3:45 PM • paper 19e • Frank Mendizabal*, Weyerhaeuser

Comments from the Electronic Industry • 4:15 PM • paper 19f • IBM

[21] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Spring

Novel Reaction Technologies R&D Funded by U.S. DOE/ITP

Joseph V Porcelli, *Chair*
JVP International, Inc.
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers

Sponsored by **DOE/ITP Funding of Novel Technologies**

Membranes for Corrosive Reactions • 2:05 PM • paper 21a • Yupo J. Lin, Michael P. Henry, Seth W. Snyder*, Argonne National Laboratory, Jamie A. Hestekin, Kraft Foods

Production and Separation of Fermentation-Derived Acetic Acid • 2:30 PM • paper 21b • Rathin Datta, Michael P. Henry, Edward J. St. Martin, Mark Donnelly, Milind Patel, Kelly A. Skinner-Nemec, Argonne National Laboratory, Robert J. Niedzielski, BP Amoco Chemical Co., David J. Law, Mike Muskett, BP Chemicals Ltd.

Nanostructured Polymeric Heterogeneous Catalyst for Industrial Applications • 2:55 PM • paper 21c • Brian J. Elliott*, TDA Research, Inc., Douglas L. Gin, University of Colorado

Direct Conversion of Alkane to Valuable Chemicals — Gas-Phase Selective Oxidation of *n*-Butane to Methyl Ethyl Ketone • 3:20 PM • paper 21d • X. Wang, M. Zubic, K. Pillai, L. Li, M. Lin, P. Jain, J. Hao, F. Dautzenberg, N. Burm, V. Chilukuri, D. Strongin, EverNu Technology, LLC, Temple University and Eindhoven University

Biphasic Hydroformylation of Higher Olefins • 3:45 PM • paper 21e • Steven Dietz*, TDA Research, Inc.

Methane to Methanol Conversion — Compatibility Study of Using Ionic Liquids as Novel Reaction Media • 4:10 PM • paper 21f • William A. Goddard III*, California Institute of Technology

Low Temperature Electrochemical Ammonia Synthesis • 4:35 PM • paper 21g • Adrian Denvir*, Kyle Uselton, Oliver Murphy, Lynntech, Inc.

[22] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Spring

Novel Separations and Enabling Technologies R&D Funded by the U.S. DOE/ITP

Joseph V Porcelli, *Chair*
JVP International, Inc.
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers

Sponsored by **DOE/ITP Funding of Novel Technologies**

Hollow Fiber as Structured Packing for Olefin/Paraffin Separation • 8:35 AM • paper 22a • Martin E. Carrera, Craig Colling, BP Amoco Chemical Co., Dali Yang*, Robert Barbero, David Devlin, Los Alamos National Laboratory

Thin Film Ceria Membranes for Oxygen Separation • 9:00 AM • paper 22b • Matthew M. Seabaugh*, Edward M. Sabolsky, NexTech Materials, Ltd.

Novel Polymer Nanocoating Processing to Produce Ceramic Nanocomposites • 9:25 AM • paper 22c • Joseph Spencer, Karen J Buechler*, ALD NanoSolutions, Inc., John Ferguson, Steven George, Alan Weimer, University of Colorado

Novel Air-VOC Chemically Inert Reverse Separation Membranes • 9:50 AM • paper 22d • Stuart Nemser*, Compact Membrane Systems Inc.

Low Emission Diesel Engines • 10:15 AM • paper 22e • Compact Membrane Systems Inc.

Distillation Column Flooding Predictor: A Cost Effective Distillation Column Debottlenecking Technology for Petrochemical Industry • 10:40 AM • paper 22f • George E. Dzyacky*, 2ndpoint, LLC

[23] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Spring

Miscellaneous Enabling Technologies R&D Funded by the U.S. DOE/ITP

Joseph V Porcelli, *Chair*
JVP International, Inc.
Jo Rogers, *Vice-Chair*
American Institute of Chemical Engineers

Sponsored by **DOE/ITP Funding of Novel Technologies**

A New Corrosion Management Technology for the Chemicals Industry • 2:05 PM • paper 23a • Randy C. John*, A. D. Pelton, A. L. Young, W T Thompson, I. G. Wright, Shell Global Solutions (US), Inc.

Flow Mapping of Gas-Solid Riser • 2:30 PM • paper 23b • M. H. Al-Dahhan, M. P. Dudukovic, S. Bhusarapu, Washington University

[24] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Kennesaw

Sustainability & Forest Biorefinery

Thomas Amidon, *Chair*
SUNY College of Environmental Science & Forestry
Kristiina Iisa, *Vice-Chair*
Georgia Institute of Technology

Sponsored by **Pulp and Paper Agenda 2020**

What Is an Integrated Forest Biorefinery and How It Will Benefit Society • 8:05 AM • paper 24a • Ben Thorp*

Willow Biomass as a Furnish Component of the Forest Biorefinery • 8:30 AM • paper 24b • Timothy Volk*, State University of New York, Syracuse

Sustainable Forest Productivity: Loblolly Pine • 8:55 AM • paper 24c • David Canavera*, MeadWestvaco

Extracting Value Prior to Pulping • 9:20 AM • paper 24d • Thomas Amidon*, SUNY College of Environmental Science & Forestry

Polyhydroxyalkanoate Production from Maple Hydrolyzate • 9:55 AM • paper 24e • James Nakas*, State University of New York, Syracuse

Chemical Extraction of Wood Hemicelluloses: An Invaluable New Proposition for the Pulp and Paper Industry • 10:20 AM • paper 24f • Lucian A. Lucia, Dimitris S. Argyropoulos, North Carolina State University, Weiping Ban*, Georgia Institute of Technology

New Value from Residuals and Spent Liquors • 10:45 AM • paper 24g • Eric D. Larson*, Princeton Environmental Institute

Cellulosic Biofuel Production from Integrated Pulp and Paper Mills • 11:10 AM • paper 24h • Farminder S. Anand, Matthew J. Realff*, Georgia Institute of Technology

[25] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Kennesaw

Sustainability & Breakthrough Manufacturing Technology

David E. White, *Chair*
Georgia Institute of Technology
Atlanta, GA
Ben Thorp, *Vice-Chair*

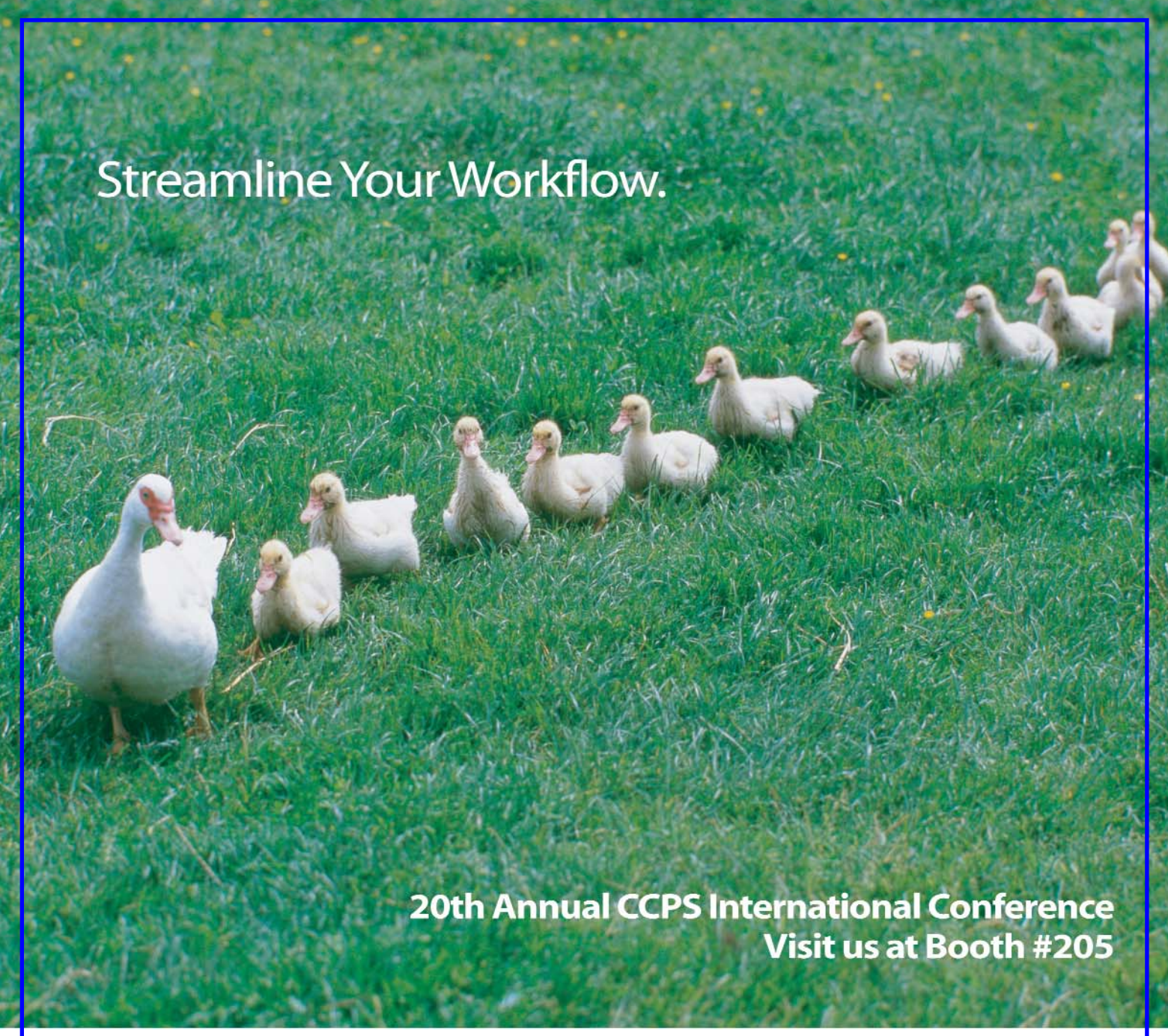
Sponsored by **Pulp and Paper Agenda 2020**

Overview: Agenda 2020 Breakthrough Manufacturing Technologies Initiative • 2:00 PM • paper 25a • David E. White*, Georgia Institute of Technology, Ben Thorp

Controlling HAPS Through Fines Reduction • 2:15 PM • paper 25b • Sujit Banerjee, IPST, Paul Stiglbauer*, Terry E Connors, University of Kentucky

Significant Enhancement in Product Properties with Existing Assets — 1: Nanotechnology • 2:45 PM • paper 25c • Phil Jones*, IMERYS

Please note: An asterisk (*) indicates the speaker.



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Significant Enhancement in Product Properties with Existing Assets — 2: Fibrous Fillers • 3:15 PM • paper 25d • Vijay K. Mather*, G. R. International

Substantial Improvement in Energy Efficiency for Existing Processes — 1: Borate Autocausticizing, Achievements, Challenges, and Opportunities • 4:00 PM • paper 25e • Josh Dunn, Saied Kochesfahani, Fazlul Alam, U.S. Borax Inc.

Fundamental Considerations for Green Liquor Pretreatment Pulping Technologies • 4:30 PM • paper 25f • Dimitris S. Argyropoulos, Lucian A Lucia*, North Carolina State University, Weiping Ban, Georgia Institute of Technology

A Detailed Examination of Lignin During Pulping and Bleaching • 5:00 PM • paper 25g • Lucian A. Lucia, Dimitris S. Argyropoulos*, North Carolina State University

[26] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Greenbriar

The Engineer in Transition to Management, III, Session 1

Daniel Hershey, *Chair*
University of Cincinnati
Eldon R. Larsen, *Vice-Chair*
Marshall University Graduate College

Sponsored by
The Engineer in Transition to Management

Tutorial: What Does it Take to Become a Leader in Corporate America or in Academia? • 8:35 AM • paper 26a • Daniel Hershey, University of Cincinnati, Frank Van Lier, The Lubrizol Corp., Joseph Alford, Eli Lilly

[27] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Greenbriar

The Engineer in Transition to Management, III, Session 2

Daniel Hershey, *Chair*
University of Cincinnati
Barbara A. Todd, *Vice-Chair*
ConocoPhillips

Sponsored by
The Engineer in Transition to Management
Co Sponsored by **18a — Liaison Functions**

Open Forum on Leadership in Corporate America and Academia • 2:05 PM • paper 27a • Frank Van Lier, The Lubrizol Corp., Joseph Alford, Eli Lilly, Daniel Hershey, University of Cincinnati

[31] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Greenbriar

Commercializing New Performance Products

Joseph V. Porcelli, *Chair*
JVP International, Inc.
Frank Van Lier, *Vice-Chair*
The Lubrizol Corp.

Sponsored by
Commercializing New Technologies

Opportunities in Carbon Nanotechnology • 8:00 AM • paper 31a • H. Wang, Terry K Baker*, Nelly M. Rodriguez, Catalytic Materials LLC

A Novel Hybrid Sorbent for Removal of Radium and Uranium from Drinking Water • 8:30 AM • paper 31b • Anuj K. Saha*, VEETech, P.C., Arup K. Sengupata, Lehigh University

Development of Sustainable and Ecofriendly Technologies for Biodegradable and Biopolymers • 9:00 AM • paper 31c • Venkateshwar Sreerangam*, Osmania University

Powder Injection Molding for Multi-Scale Fabrication • 9:30 AM • paper 31d • Seong Jin Park, Cetatech,Roshan Urval, Sundar V, Atre*, Oregon State University

Improving of Polymer Mechanical Properties by a New Dynamic Injection Molding Technology • 10:00 AM • paper 31e • Xiangfang Peng*, Chao Xu, Nanqiao Zhou, Jinping Qu, National Engineering Research Center of Novel Equipment for Polymer Processing, South China University of Technology, Qinggui Lan, Key Laboratory of Polymer Processing Engineering, Ministry of Education, South China University of Technology

Novel Dynamic Processing Technology for Microcellular Plastics • 10:30 AM • paper 31f • Xiangfang Peng, Nanqiao Zhou, Wenli Zhu*, National Engineering Research Center of Novel Equipment for Polymer Processing, South China University of Technology

[32] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Greenbriar

Choosing and Successfully Completing the Right R&D Projects

Joseph V. Porcelli, *Chair*
JVP International, Inc.
Frank Van Lier, *Vice-Chair*
The Lubrizol Corp.

Sponsored by
Commercializing New Technologies

Securing Your Rights: The Basics of Patentability • 2:05 PM • paper 32a • Neal Seth*, Finnegan Henderson *et al*,

Key Success Factors in Project Selection • 2:35 PM • paper 32b • Emily Helmes*, Independent Project Analysis

Realizing Success in Commercializing New Technology • 3:05 PM • paper 32c • Independent Project Analysis

R&D Project Assessment Tool Measures Impact Based on Industrial Adoption Rates • 3:35 PM • paper 32d • Karla E. Bell, Bill Choate, BCS, Inc., Dickson Ozokwelu*, U.S. Dept. of Energy, Joseph V Porcelli, JVP International, Inc.

[34] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Regency VII

Rotating Machinery — Equipment Energy & Reliability Enhancements (Paper Session)

Mike Thuillez, *Chair*
GE Energy Oil & Gas
Kevin Kisor, *Vice-Chair*
MAN Turbo

Sponsored by **Ethylene Producers Conference**

Critical Rotating Equipment Strategies to Achieve 1st Quartile Performance • 8:05 AM • paper 34a • Brad Johnson*, Dow Chemical

Process Impact on Critical Turbomachinery Reliability Assessment • 8:30 AM • paper 34b • Charlie Rutan*, Equistar Chemicals LP

Merits of Low Speed and/or Operating Speed Balancing of Compressor and Turbine Rotor Assemblies • 9:00 AM • paper 34c • Chet Stroh, Sandye Simmons*, Turbocare

Minimum Requirements for Field Testing and Monitoring of Turbomachinery • 9:30 AM • paper 34d • Mark Cooper*, Lyondell/Equistar

Case Studies of Low Speed Operation on Dry Gas Seals and Bearings • 10:00 AM • paper 34e • Joe Delrahim, John Crane, Chris Stewart*, Turbocare

Turboexpander-Compressors with Oil Free Magnetic Bearing Technology to Enhance Cold Box Performance • 10:20 AM • paper 34f • Reza Agahi*, GE Energy Oil & Gas, Kazim Akhtar, ABB Global, Chet Farabaugh, Kingsbury Magnetic Bearings

[35] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Regency V and VI

Feedstock Contaminants in Ethylene Plants — Mercury (Paper Session)

Jeff Bone, *Chair*
Chevron Phillips Chemical Co.
Marilyn Blaschke, *Vice-Chair*
Baker Petrolite

Sponsored by **Ethylene Producers Conference**

Mercury Contamination in Ethylene Plants - An Overview • 8:05 AM • paper 35a • John A. Reid, Consultant, Steve Coleman*, Equistar Chemicals, LP

Analytical Methods for Mercury • 8:20 AM • paper 35b • Mark Brayden*, Dow, Mike Potter, Shell Chemical Co., James Graham, ExxonMobil Chemical Co.

Understanding and Preventing Failure of Aluminum Equipment in the Presence of Liquid Mercury • 8:40 AM • paper 35c • Ron Bell*, Chart Heat Exchangers

Mercury and its Impact on Ethylene Purification Catalysts • 9:25 AM • paper 35d • Raghu Menon*, Sud-Chemie Inc.

Mercury Removal — An Overview • 9:45 AM • paper 35e • John A. Reid, Consultant, Marilyn Blaschke*, Baker Petrolite

Operating Company Experiences with Mercury • 10:05 AM • paper 35f • Jeff Bone*, Chevron Phillips Chemical Co.

[36] Monday, April 11, 1:30 PM Hyatt Regency Atlanta, Regency V and VI

Keynote Speaker

Sponsored by **Ethylene Producers Conference**

The Energy Outlook • 1:35 PM • paper 36a • Steve P. Hart*, ExxonMobil Chemical Co.

[37] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Learning Center

Rotating Machinery — Equipment Energy & Reliability Enhancements (Roundtable Session)

Please note: An asterisk (*) indicates the speaker.

Gampa Bhat, *Chair*
Exxon Mobil Chemical Co.
Terryl Matthews, *Vice-Chair*
Bechtel Corp.

Sponsored by **Ethylene Producers Conference**

[38] Monday, April 11, 2:15 PM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plant Safety (Paper Session)

Ray B. Stroud, *Chair*
Eastman Chemical Co.
Mark Moderski, *Vice-Chair*
ABB Lummus Global

Sponsored by **Ethylene Producers Conference**

Reactivity of High Pressure Ethylene Containing Minor Amounts of Acetylene • 2:20 PM • paper 38a • Marc E. Levin*, Shell Global Solutions (US) Inc.

Autorefrigeration Near-Miss Incident at Equistar Chemicals • 2:45 PM • paper 38b • Mike Kennedy*, Equistar Chemicals LP

Pipeline Integrity of Ethylene Pipelines • 3:10 PM • paper 38c • Roger Breitkreutz, Tom R. Jack, Greg Nordquist*, NOVA Chemicals Corp.

Waste Stream Incineration Results in Process Fire • 3:35 PM • paper 38d • Randy Saunders*, Nova Chemicals

Learning from Past Incidents • 4:00 PM • paper 38e • David S. Flett*, Huntsman Petrochemicals UK Ltd.

[39] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Regency VII

Ethylene Plant Process Control (Paper Session)

Don Bartusiak, *Chair*
Exxon Mobil Chemical Co.
Jim Hackney, *Vice-Chair*
Equistar Chemicals LP

Sponsored by **Ethylene Producers Conference**

Best Practices of MPC/RTO in Ethylene • 8:35 AM • paper 39a • Elizabeth Teeter, Landmark, Mark Darby*, University of Houston

Development of Simplified Cracker Yield Model Correlation Based on SPYRO Rigorous Simulator for Various Operational Optimization Applications • 9:00 AM • paper 39b • Gastao Moraes*, Donald Cruse, Erica Claro, Poliana Rosinha, Gilberto Muller, Companhia Petroquimica do Sul - Copesul, Joseph DeFazio, Bhieng Tjoa, Optience Corp., Omar A Hamid, Technip USA Corp.

New AspenTech DMC Controller design for the C3 Hydrogenation Reactors in an Ethylene Plant • 9:25 AM • paper 39c • Jose Pedro Braga*, Andre Vilelas, Repsol Polimeros, Lda, Alexandre Mota, Rui Chaves, Borealis Polimeros, Lda

Supporting Key Console Operator Interactions through the Control System Interface • 10:05 AM • paper 39d • Jamie Errington, Human Centered Solutions, LLP, Tim J DeMaere*, Nova Chemicals

Advanced Process Control Computer-Based Operator Training • 10:30 AM • paper 39e • Chandra Gannavarapu, Aspen Technology, Edward E. Chang*, Equistar Chemicals

Early Event Detection • 10:55 AM • paper 39f • Wendy Foslien, Honeywell International, Michael B. Bell*, Nova Chemicals Corp.

[40] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Learning Center

Ethylene Plant Process Control - Abnormal Situation Management (Roundtable Discussion)

Don Bartusiak, *Chair*
Exxon Mobil Chemical Co.
Eric Gildea, *Vice-Chair*
ABB Automation

Sponsored by **Ethylene Producers Conference**

Roundtable Discussion on Abnormal Event Management • 2:00 PM • paper 40a • Eric Gildea*, ABB Automation, Michael B. Bell, Nova Chemicals Corp., Mike Clark, BP Chemicals, Ken Emigholz, ExxonMobil Research & Engineering, Don Morrison, ASM Consortium, Ian Nimmo, User Centered Design Services, Ramesh Vaidhyanathan, Plant Automation Services, Venkat Venkatasubramanian, Purdue University

[41] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plant Operations (Paper Session)

Matt Taylor, *Chair*
DuPont
Steve Stinnette, *Vice-Chair*
Huntsman Corp.

Sponsored by **Ethylene Producers Conference**

Development of a Parking Mode at Shell Chemical's Deer Park Plant Olefin Unit OP-III • 2:10 PM • paper 41a • Bryce E. Kagay, Nicolas Genty*, Shell Chemical LP

Analyses of a Rapid Loss of a Steam System During a Power Failure • 2:35 PM • paper 41b • Andre Bernard*, NOVA Chemicals Ltd.

Shell Deer Park OP-III PGC Vibration • 3:00 PM • paper 41c • Bryce E. Kagay, Mia Zager*, Shell Chemical Co.

Flare Minimization at Dow Freeport • 3:40 PM • paper 41d • Steve Krietenstein*, Dow

Catastrophic Steam Turbine Overspeed Incident • 4:05 PM • paper 41e • Lloyd Filemon*, Total Refinery, Peter Van Limmen, Dow Chemical

[42] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plant Technology — Refrigeration Systems (Technology Review)

Dennis Tiemeier, *Chair*
Dow Chemical, Texas Operations
Colin Bowen, *Vice-Chair*
Stone and Webster Inc.

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Refrigeration Technology as Practiced in Olefin Plants • 8:30 AM • paper 42a • Tom Pickett*, Barnes & Click, Inc.

Design Considerations for Centrifugal Compressors in Refrigeration Duty • 9:15 AM • paper 42b • John C. Wright, James F. Blahovec*, William C. Hohlweg, Elliott Turbomachinery Co., Inc.

Turboexpanders in Ethylene Plants • 10:00 AM • paper 42c • Joseph K. Lillard*, Mafi-Trench Corp.

Mixed Refrigerant Systems for Ethylene Plants • 10:25 AM • paper 42d • Qi Ma*, Sanjeev Kapur, ABB Lummus Global

LNG & Ethylene Plant Refrigeration Systems • 10:50 AM • paper 42e • Julio Rios*, Steven Borsos, Kellogg Brown & Root

[43] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Regency VII

Ethylene Plant Environmental Issues Control of Air Emissions (Paper Session)

Mike Kennedy, *Chair*
Equistar Chemicals LP
Keith Wade, *Vice-Chair*
John Zink Co., LLC

Sponsored by **Ethylene Producers Conference**

How Industry Sponsored Air Monitoring is Being Used to Drive Air Quality Improvements in the Houston Area • 8:40 AM • paper 43a • Walt Crow*, URS Corp.

Title V Reporting and Investigation Process for Texas Operating Sites • 9:05 AM • paper 43b • Stephanie D. King*, Equistar Chemicals, LP

Experiences in the Installation of Hydrocarbon Monitoring Systems for Flares and Cooling Towers • 9:30 AM • paper 43c • Randolph H. Smith*, Equistar Chemicals, LP

Impact of Ethylene Emissions on Commercial Crops • 10:10 AM • paper 43d • Tom R. Jack, NOVA Chemicals Corp., Daniel J. Archambault, Xiaomei Li, Alberta Research Council, Inc., Kenneth Foster*, AMEC Earth & Environmental, a Div. of AMEC Americas, Ltd.

Developing and Managing a New Ambient Air Quality Objective for Ethylene in Alberta, Canada: A Multi-Stakeholder Approach • 10:35 AM • paper 43e • AMEC Earth & Environmental, a Div. of AMEC Americas, Ltd., Jim Dixon*, Lois Cramer, NOVA Chemicals Corp.

A Low NOx Burner Developed for ExxonMobil Ethylene Furnaces • 11:00 AM • paper 43f • David Spicer, George Stephens*, ExxonMobil Chemical Co., Olefins Technology Div.

[44] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Learning Center

Ethylene Plant Technology — Refrigeration Systems (Roundtable Session)

Dennis Tiemeier, *Chair*
Dow Chemical, Texas Operations
Colin Bowen, *Vice-Chair*
Stone and Webster Inc.

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Brazed Aluminum Plate Fin Heat Exchangers — Their Construction, Uses, and Advantages

Please note: An asterisk (*) indicates the speaker.

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in Cryogenic Refrigeration Systems • 2:00 PM • paper 44a • Dan Markussen*, Russ Ford, Chart Industries

Storage of Liquefied Ethylene: Current Concepts • 2:25 PM • paper 44b • John Blanchard*, CB&I

Mega-Cracker Cold Section Energy Integration • 2:50 PM • paper 44c • David Gent*, Nova Chemicals Ltd.

Ethylene Plant Technology — Refrigeration Systems (Roundtable Session) • 3:40 PM • paper 44d • Colin Bowen*, Stone and Webster Inc.

[45] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plant Safety — Safety Instrumented Systems (Technology Review)

Mark Moderski, *Chair*
ABB Lummus Global
Jan C. A. Windhorst, *Vice-Chair*
NOVA Chemical

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IEC 61511 and the Capital Project Process • 2:05 PM • paper 45a • Angela Summers*, SIS-Tech Solutions

Safety Instrumented Shutdown System Design Strategy for an Acetylene Hydrogenation Reactor System at Eastman Chemical Company • 2:50 PM • paper 45b • Kevin H McGuire*, Eastman Chemical Co.

Dow St. Charles Use of SIS for Excess Pressure Management • 3:05 PM • paper 45c • Jim Verboon*, Dow Chemical Co.

[46] Thursday, April 14, 8:00 AM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plenary Session

Bob Strack, *Chair*
Exxon Mobil Chemical Co.
Rashmi Shah, *Vice-Chair*

Sponsored by **Ethylene Producers Conference**

Global Ethylene Plant Performance Comparisons • 8:00 AM • paper 46a • Claire Cagnolatti*, Solomon Associates

[47] Thursday, April 14, 8:35 AM Hyatt Regency Atlanta, Regency V and VI

Ethylene Plant Fundamentals — Improvements in Modeling and Testing Reaction Systems and Furnace Performance

G. Froment, *Chair*
Texas A&M University
David J. Brown, *Vice-Chair*
Stone & Webster

Sponsored by **Ethylene Producers Conference**

Primary Distribution Products from the Pyrolysis of Cyclo-alkanes • 8:40 AM • paper 47a • M. Dente, S. Pierucci, E. Ranzi, CMIC, Politecnico di Milano, S. Barendregt, P. Valkenburg, Technip Benelux

Estimation of the Selectivities of the First-Order Reaction in Naphtha Pyrolysis Process Based on Fuzzy Matching Method • 9:05 AM • paper 47b • Xiaorong He, Bingzhen Chen, Xiaodan Gao*, Tsinghua University

Advanced CFD Tools for Modeling Lean Premixed Combustion in Process Heaters • 9:30 AM • paper 47c • David J. Brown*, Stone & Webster, Qing Tang, Brad Adams, Mike Bockelie, Martin Denison, Chris Montgomery, Adel Sarofim, Reaction Engineering International, Mark Cremer, Cremer

Carburization Resistance of High-Cr, High-Ni Weld Overlaid Furnace Tubes for Ethylene Pyrolysis • 10:15 AM • paper 47d • Frans X. Terwijn, TACT/Daido Steel Co., Ltd., Toshihide Maeda*, Maeda

Accelerating Innovation in Olefins Production by Application of High Throughput Experimentation • 10:40 AM • paper 47e • Jens Klein, Alfred Haas, Jason King, Stephan Andreas Schunk*, the Aktiengesellschaft

Centralloy60HT — Alloy Development for High Temperature Operation and Reduced Coking • 11:05 AM • paper 47f • Benno-Ganser Schmidt, Dietlinde Jakobi, Clemens GmbH and Co.

[48] Thursday, April 14, 8:35 AM Hyatt Regency Atlanta, Regency VII

Ethylene Plant Maintenance — Maintenance of Emission Control Devices (Paper Session)

Larry Bayer, *Chair*
Williams Olefins LLC

Sponsored by **Ethylene Producers Conference**

Leak Detection and Repair (LDAR) Maintenance Program • 8:45 AM • paper 48a • Gerard Lassere*, Shell Chemical Co.

Reduce Compressor Emissions with Dry Gas Shaft Seals • 9:05 AM • paper 48b • Joe Delrahim*, John Crane

Misapplication of Dry Running Seals in Low Temperature Process Service • 9:25 AM • paper 48c • Lou J Trahan*, E. I. du Pont de Nemours

Maintaining a Combustion Emissions Monitoring System (CEMS) • 10:05 AM • paper 48d • James E. Ferrel*, BASF Corp.

Successful Sealing of Heat Exchangers Due To The Implementation of New Technology In a Gasket System • 10:25 AM • paper 48e • Julie L. Simonton*, Lamons Gasket Co., David W. Reeves, Chevron Texaco

Advances in Reductions of Fugitive Emissions from Valves • 10:45 AM • paper 48f • Charles Pogue*, Velan Valve Corp.

Dual Seal Systems for Controlling Emissions from Machinery • 11:05 AM • paper 48g • Frank Huntington*, John Crane Inc.

[60] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Courtland

Hydrotreating Catalyst Tutorial

Stuart Shih, *Chair*
Exxon Mobil Chemical Co.
Peter Kokayef, *Vice-Chair*
UOP LLC

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Hydrotreating Catalyst Loading, Activation, and Conditioning • 8:05 AM • paper 60a • Larry S. Kraus*, Albemarle Catalysts Co. LP

Hydrotreating Catalysts for Ultra Low-Sulfur Naphtha and Diesel Production • 8:50 AM • paper 60b • Henrik W. Rasmussen*, Haldor Topsoe Inc.

The Principles and Practices of FCC Feed Pretreating • 9:35 AM • paper 60c • Paul J. Ceccato*, Criterion Catalysts

Residue Hydroprocessing Catalysts — Function and Application • 10:20 AM • paper 60d • Woodrow K. Shiflett*, ChevronTexaco Products Co./Advanced Refining Technologies

[61] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Courtland

Advances in Hydrotreating and Ultra-Clean Fuel Production

Jinwen Chen, *Chair*
National Center for Upgrading Technology (NCUT)
Mike Schultz, *Vice-Chair*
UOP LLC

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Development of New Catalyst Systems and Innovative Solutions for Meeting New Diesel Specifications • 2:10 PM • paper 61a • Madhusudan Sau, Ujjwal Manna, Ganesh V. Butley, Hillol Biswas, Manoranjan Santra, Ram Prakash Verma*, Indian Oil Corp. Ltd., Research and Development Centre

Effect of Vapor Liquid Phase Equilibrium on Hydrodesulphurization Kinetics • 2:35 PM • paper 61b • Jinwen Chen*, Hong Yang, Zbigniew Ring, National Center for Upgrading Technology

Catalytic Hydrodesulphurization of DBTs in the Presence of Aromatics • 3:00 PM • paper 61c • Jinwen Chen*, Hong Yang, Zbigniew Ring, National Center for Upgrading Technology (NCUT), Nobumasa Nakajima, bCosmo Oil Co. Ltd., Tao Song, Jason Zhang, University of New Brunswick

Equilibrium Limitations in Distillate Hydrotreating • 3:25 PM • paper 61d • Peter Kokayeff, Laura E. Jones*, UOP LLC

Effect of Hydrotreating Conditions on Maya Asphaltenes Composition and Structural Parameters • 3:50 PM • paper 61e • J. Ancheyta*, Instituto Mexicano del Petróleo, F. Trejo, Ciudad Universitaria, Facultad de Química

Gas-Liquid Distribution in Trickle Flow Regime Through a Fixed Catalyst Bed Reactor Used in a Hydrodesulphurization Process • 4:15 PM • paper 61f • Abdelhakim Koudil*, Isabelle Harter, IFP

[62] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Courtland

Refinery Reliability, Safety and Protection

Tim Olsen, *Chair*
Emerson Process Management
James W. Harris, *Vice-Chair*
UOP-LLC

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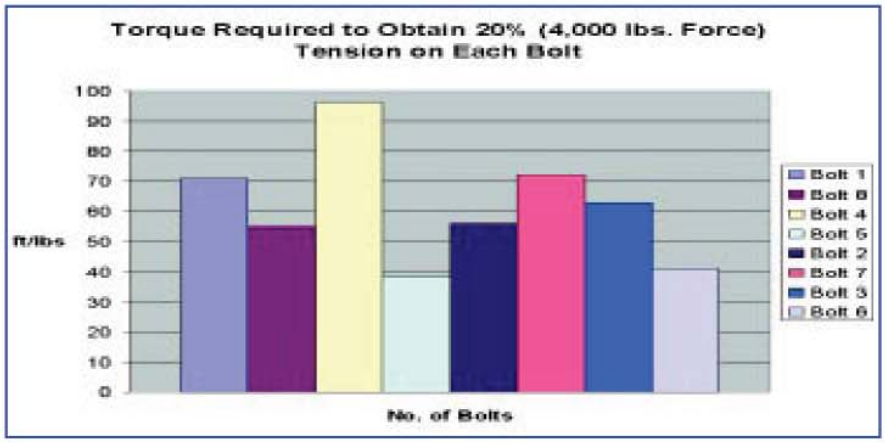

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Non Linear Analysis of Catastrophic Failure Effects in a Multi Objective Intra Refinery Optimization • 8:35 AM • paper 62a • Ahmed S. Khogeer*, CSU

Selecting "Sensors" for Safety Instrumented Systems per IEC 61511 (ISA 84.00.01 – 2004) • 9:05 AM • paper 62b • Dale Perry*, Emerson Process Management

Abnormal Situation Prevention through Smart Field Devices • 9:35 AM • paper 62c • Pete Sharpe, Evren Eryurek*, Emerson Process Management

Use Weibull Analysis and Reliability Modeling to Improve Reciprocating Compressor Reliability • 10:05 AM • paper 62d • Jose Diaz, Keith Parsell, ExxonMobil Research and Engineering Co., Kirtan K Trivedi*, Exxon Mobil Chemical Co.

[63] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Courtland

Advances in Fluid Catalytic Cracking

David M. Stockwell, *Chair*
Engelhard Corp.
Pete Van Opdorp, *Vice-Chair*
UOP LLC

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The Art of Evaluating Laboratory Fixed Bed Catalytic Cracking Data • 2:00 PM • paper 63a • Larry L. Upson, William J. Reagan*, UOP LLC

Laboratory Evaluation of Gasoline Sulfur Reduction Additives • 2:40 PM • paper 63b • Julie A. Francis*, Albemarle Catalysts Co., LP

Integrating Resolve Desulfurization Technology with Novel Process Concepts in Commercial FCCU Operations • 3:00 PM • paper 63c • Chris W. Kuehler*, Albemarle Catalysts, Kelly Benham, Petro-Canada

Intra-Particle Mass Transfer and Contact Time Effects in FCC • 3:20 PM • paper 63d • David M. Stockwell*, Engelhard Corp.

Modeling and Model Validation of a FCCU Regenerator • 3:40 PM • paper 63e • Jober C. Penteado, Luciano F. S. Rossi, Cezar O. R. Negrao*, CEFET-PR, Curitiba-PR

Laboratory Evaluation of Emission Control Additives and Their Deactivation Using In-Situ Coke Combustion • 4:00 PM • paper 63f • Darrell Rainer, Jorge A. Gonzalez, Lin Luo*, Albemarle Catalysts Co. LP

Catalytic Attributes of Self-Supported Hydrotalcite • 4:20 PM • paper 63g • Albert Vierheilig, Michael K. Maholland*, Intercat, Inc.

New Developments in Low-NOx CO Combustion Promoters • 4:40 PM • paper 63h • Darrell Rainer*, Lin Luo, Albemarle Catalysts Co. LP

[64] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Spring

Modeling, Simulation and Control for the Oil and Gas Industry

Tim Olsen, *Chair*
Emerson Process Management
Kurt VandenBussche, *Vice-Chair*
UOP LLC

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A Rolling Horizon Approach with Aggregation for Supply Chain Optimization of Refinery Industry • 2:05 PM • paper 64a • Jehoon Song, LG CNS, Minhwan Park*, Sunwon Park, KAIST, Daejeon, Ignacio E. Grossmann, Carnegie Mellon University

Evaluating Materials for High Temperature Hydrogen Separation Using Grand Canonical Monte Carlo and Molecular Dynamics Simulations • 2:35 PM • paper 64b • Martha C. Mitchell*, Marco Gallo-Estrada, V. K. K. Upadhyayula, New Mexico State University, Tina M. Nenoff, Sandia National Laboratories

Micro Motion Improving the Efficiency of the SMR Hydrogen Production Unit • 3:05 PM • paper 64c • Winfried Hoglen*, Air Products, Julie Valentine, Micro Motion Inc.

Structure-Based Generalizations for Multiple Temperature Infinite-Dilution Activity Coefficients Data for Aqueous Systems • 3:35 PM • paper 64d • Srinivasa S. Godavarthy*, Robert L. Robinson Jr., Khaled A M Gasem, Oklahoma State University, Brian J Neely, Neely

[65] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Courtland

Resid Upgrading Tutorial

Irv Wiehe, *Chair*
Soluble Solutions
Belma Demirel, *Vice-Chair*
Rentech, Inc.

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Recent Advances in Residue Upgrading Fundamentals • 8:30 AM • paper 65a • Murray R. Gray*, University of Alberta

Tutorial: Delayed Coking Fundamentals • 9:30 AM • paper 65b • Christopher A. Paul, Great Lakes Carbon Corp., Paul J. Ellis*, Petro-Carbon-Help

Resid Upgrading: Technology, Limitations, and Potential • 10:30 AM • paper 65c • Irv Wiehe*, Soluble Solutions

[66] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Courtland

Advances in Resid Upgrading

Syamal Poddar, *Chair*
Mike Oballa, *Vice-Chair*
Nova Chemicals Corp.

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Tailoring RTDs in Fluidized Beds for Improved Coker Yields — The Envision Technologies Corp. Cross-Flow Coker • 2:00 PM • paper 66a • Robert Pinchuk*, Envision Technologies, Wayne Brown, Gerard Monaghan, Envision Technologies Corp.

Simulating the Adsorption of Asphaltenes on Macroporous Materials Using Model Molecules • 2:30 PM • paper 66b • Clementina Sosa*, Manuel F. Gonzalez, Francisco Lopez-Linares, Pedro R. Pereira-Almao, University of Calgary

Ultradispersed Catalysts for Processing Heavy Hydrocarbon Fractions • 3:00 PM • paper 66c • Josephine Hill, Jie Wang, Alejandro Vasquez, Pedro R. Pereira-Almao*, University of Calgary

Synthesis and Thermal Reactions of Model Compounds for Bitumen Residue • 3:30 PM • paper 66d • Murray R. Gray*, Felaniaina Rakotondradany, University of Alberta, Hicham Fenniri, National Institute Nanotechnology

[67] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Lenox

Sulfur Management

Helmy Andrawis, *Chair*
Parsons E&C
Lon Stern, *Vice-Chair*
Shell Global Solutions US Inc.

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16 - Fuels and Petrochemicals Div.

A Case Study of SRU Performance Using a New Titania Claus Catalyst • 2:05 PM • paper 67a • Elise M. Mophett*, Mike J. Pearson, Almatis AC, Inc.

Flexibility of Liquid Redox Processing in Refinery Sulfur Management • 2:35 PM • paper 67b • Gary J. Nagl*, Gas Technology Products LLC

Steady State Simulation of DEA Amine Plant at Bahrain Petroleum Company (BAPCO) using HYSYS to Reduce H_2S Emission • 3:05 PM • paper 67c • Majeed S. Jassim*, University of Bahrain

SRU Overpressure in a Waste Heat Boiler Failure • 3:35 PM • paper 67d • Justin A. Lamar*, Black & Veatch

The "Engineered Approach" to SRU Refractory Linings, Three Keys to Reliability • 4:05 PM • paper 67e • Jeff Proctor*, Thorpe Corp., Houston, TX

Integrated Acid Gas Enrichment, Sulfur Recovery and Tail Gas Treating Technology for Processing Ultra Lean Acid Gases • 4:35 PM • paper 67f • Richard B. Nielsen, John Mak, Fluor Enterprises, Inc., Thomas K. Chow, Fluor Energy & Power, Vincent W. Wong, Fluor Corp.

[68] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, Courtland

Hydrogen Management

Sanjiv Ratan, *Chair*
Technip USA
Eugene A. Kuchta, *Vice-Chair*
UOP

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Hydrogen Management for Clean Fuels and Profit • 8:40 AM • paper 68a • Alan Zagoria*, UOP

Managing Hydrogen "Value" Enhancement • 9:15 AM • paper 68b • Sanjiv Ratan*, Technip USA

Effects of Hydrocarbon Feed Type on Operating Costs and Environmental Impact on a Steam Reforming Based Hydrogen Plant • 9:50 AM • paper 68c • Peter V. Broadhurst*, Bill J. Cotton, Mick Hilton, Johnson Matthey Catalysts

Impact of Gas Phase Impurities on Refinery Hydrogen Network Management • 10:25 AM • paper 68d • Bhari Bhujan Singh*, Nan Zhang,

Please note: An asterisk (*) indicates the speaker.

Centre for Process Integration, CEAS, The University of Manchester

[69] Thursday, April 14, 8:30 AM
Hyatt Regency Atlanta, Lenox

Advances in Membrane Separation Technologies

Mike Oballa, *Chair*
Nova Chemicals Corp.
Stuart Shih, *Vice-Chair*
Exxon Mobil Chemical Co.

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Future Directions in Membrane Technology • 8:35 AM • paper 69a • Richard D. Noble*, University of Colorado

Commercialization of Membrane Technology for Refining Application • 9:25 AM • paper 69b • Xinjin Zhao*, W. R. Grace

Anti-Fouling Membranes for Water Treatment • 9:50 AM • paper 69c • Norman N. Li*, Richard Q. Song, Jame C. Li, NL Chemical Technology

Stable Multi-Membrane Module Prepared by Counter Diffusion CVD for High Temperature Hydrogen Separation • 10:15 AM • paper 69d • Suraj Gopalakrishnan*, Hitoshi Aida, Mikihiro Nomura, Takashi Sugawara, Shin-ichi Nakao, Dept. of Chemical System Engineering, University of Tokyo

Novel Polymeric-Metallic Composite Membranes for CO_2 Separations at Elevated Temperatures • 10:40 AM • paper 69e • Jennifer S. Young*, K.A. Berchtold, Los Alamos National Laboratory, Vivek Khare, Alan R. Greenberg, University of Colorado, Eric S. Peterson, Idaho National Engineering and Environmental Laboratory, J. Acquaviva, F. Onorato, S. Hopkins, Pall Corp.

Carbon Molecular Sieve Membranes for Gas and Vapor Separations • 11:05 AM • paper 69f • Richard J. Ciora*, Paul K. T. Liu, Media and Process Technology Inc.

[72] Monday, April 11, 8:10 AM
Hyatt Regency Atlanta, Vinings

Path Forward to a Hydrogen Economy Plenary

John F Kotek, *Chair*
DOE Idaho Operations Office
Mohamed S. El-Genk, *Vice-Chair*
University of New Mexico

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14 — Nuclear Engineering Div.

Nuclear Hydrogen from a Utility Perspective • 8:30 AM • paper 72a • Dan Keuter, Steve Melancon, Entergy

U.S. Nuclear Hydrogen Initiative • 9:30 AM • paper 72b • John F. Kotek*, DOE Idaho Operations Office

Nuclear Hydrogen Production • 10:00 AM • paper 72c • Paul S. Pickard*, Sandia National Laboratories, New Mexico

Matching Hydrogen Production Needs with Nuclear Reactor Capabilities: The Advanced High-Temperature Reactor • 10:30 AM • paper 72d • Charles Forsberg*, Oak Ridge National Laboratory

The H2-MHR: A Generation IV Concept for Hydrogen Production • 11:00 AM • paper 72e • Matt Richards*, Arkal Shenoy, Ken Schultz, Lloyd C. Brown, General Atomics

[73] Monday, April 11, 2:00 PM
Hyatt Regency Atlanta, Vinings

Plant Design and System Analysis for Nuclear Hydrogen Production

William Summers, *Chair*
Savannah River National Laboratory
Lloyd C. Brown, *Vice-Chair*
General Atomics

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14 — Nuclear Engineering Div.

Plant Design and Economic Analysis of a Nuclear Hydrogen Production System • 2:00 PM • paper 73a • William Summers*, Savannah River National Laboratory

Molten Salt/Helium Comparison for Intermediate Heat Exchange Loop • 2:30 PM • paper 73b • Lauren Paoletti, Edward J. Lahoda, Keith D. Task*, Westinghouse

Model-Based Performance Comparison of Thermochemical Nuclear Hydrogen Processes • 3:00 PM • paper 73c • Maximilian B. Gorensek*, Savannah River National Laboratory

H_2 Production Using High Temperature Steam Electrolysis Supported by Advanced Gas Reactors with Supercritical CO_2 Cycles • 3:30 PM • paper 73d • Mujid S. Kazimi, Katherine J. Hohnholt, Massachusetts Institute of Technology, Bilge Yildiz*, Argonne National Laboratory

Hydrogen Markets: Implications for Hydrogen Production Technologies • 4:00 PM • paper 73e • Charles Forsberg*, Oak Ridge National Laboratory

Economics of Using High Temperature Electrolysis and Advanced Nuclear Cycles for at Sea Synthesis of Logistic Fuel for the United States Navy • 4:30 PM • paper 73f • Charles Smith, Northrop Grumman Newport News, Robert C. Carrington, Lyman J. Frost*, Idaho National Laboratory

[74] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Vinings

Developments in Electrolytic and Hybrid Routes to Hydrogen Production

Michael F. Simpson, *Chair*
Argonne National Laboratory
Steve Sherman, *Vice-Chair*
Argonne National Laboratory

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A Novel Method for Producing Hydrogen Based on the Ca-Br Cycle • 8:30 AM • paper 74a • Vivek Utgikar, University of Idaho, Michael F. Simpson*, Argonne National Laboratory, Prateek Sachdev, Christopher D. McGrady, Argonne National Laboratory-West

Steps in the Development of a Low Temperature Thermochemical Cycle for Producing Hydrogen • 8:55 AM • paper 74b • Michele A. Lewis*, Argonne National Laboratory

Hydrogen from the Calcium-Bromine Cycle — Laboratory Demonstration Requirements • 9:20 AM • paper 74c • Richard D. Doctor*, Argonne National Lab, Diana T. Matonis, Argonne National Laboratory

Computational Fluid Dynamic (CFD) Modeling of Bipolar Steam Solid Oxide Electrolyzer Cells (SOECs) • 9:45 AM • paper 74d • Argonne National Laboratory, Richard D. Doctor, Argonne National Lab

Electrochemical Generation of Hydrogen via Thermochemical Cycles • 10:10 AM • paper 74e • PremKumar Sivasubramanian*, University of South Carolina

Experimental Results in the Use of High Temperature Electrolysis for the Production of Hydrogen • 10:35 AM • paper 74f • J. Stephen Herring*, James E. Obrien, Carl M. Stoots, Paul A. Lessing, Manohar Sohal, Grant L. Hawkes, Idaho National Laboratory, Joseph J. Hartvigsen, S. Elangovan, Ceramatec, Inc.

Thermal-Fluid and Electrochemical Modeling and Performance Study of a Planar Solid Oxide Electrolysis Cell • 11:00 AM • paper 74g • Bilge Yildiz*, Tanju Sofu, Argonne National Laboratory

[75] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Vinings

Developments in Thermochemical Routes to Hydrogen Production I

Maximilian B. Gorensek, *Chair*
Savannah River National Laboratory
Amy C. Taylor, *Vice-Chair*
U.S. Department of Energy

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Flowsheet Study of the Thermochemical Water-Splitting IS Process for Effective Hydrogen Production • 2:00 PM • paper 75a • Kaoru Onuki, Seiji Kasahara*, Ryutaro Hino, Shinji Kubo, Japan Atomic Energy Research Institute, Shin-ichi Nakao, Mikihiro Nomura, University of Tokyo

Hydrogen Production by Means of S-I Thermochemical Cycle Powered by Combined Solar-Fossil Energy • 2:25 PM • paper 75b • Michela Lanchi*, Alberto Giaconia, Roberto Grena, Raffaele Liberatore, Pietro Tarquini, ENEA

Membrane Processes for the Sulfur-Iodine Thermochemical Cycle • 2:50 PM • paper 75c • Michael G. Jones, Frederick F. Stewart*, Christopher J. Orme, Idaho National Laboratory

Construction Material Development in Sulfur-Iodine Thermochemical Water-Splitting Process for Hydrogen Production • 3:15 PM • paper 75d • Bunsen Wong*, Lloyd C. Brown, Bob Buckingham, Benjamin E. Russ, Gottfried Besenbruch, General Atomics, Ancila Kaiparambil, Radhakrishnan Santhanakrishnan, Ajit Roy, UNLV

HI Decomposition — A Comparison of Reactive and Extractive Distillation Techniques for the Sulfur-Iodine Process • 3:40 PM • paper 75e • Benjamin E. Russ*, Gottfried Besenbruch, Lloyd C. Brown, Bob Buckingham, Bunsen Wong, General Atomics

Applicability of Inorganic Membranes for Improving the Sulfur-Iodine Process for the Production of Hydrogen Using Nuclear Energy • 4:05 PM • paper 75f • Brian L. Bischoff*, Dane F. Wilson, Lee D. Trowbridge, Louis K. Mansur, Charles Forsberg, Oak Ridge National Laboratory

Quantitative Analysis of the Sulfur-Iodine Cycle Through Process Simulation • 4:30 PM • paper 75g • Paul M. Mathias*, Lloyd C. Brown, General Atomics

[76] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Vinings

Developments in Thermochemical Routes to Hydrogen Production II

Amy C. Taylor, *Chair*
U.S. Department of Energy
Maximilian B. Gorensek, *Vice-Chair*
Savannah River National Laboratory

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Solar Thermochemical Production of Hydrogen • 8:30 AM • paper 76a • Aldo Steinfeld*, ETH-Swiss Federal Institute of Technology

Stability of Sulfuric Acid Decomposition Catalysts for Thermochemical Water Splitting Cycles • 8:55 AM • paper 76b • Daniel M. Ginosar*, Anne W. Glenn, Lucia M. Petkovic, Idaho National Laboratory

Life Cycle Assessment of Ispra Mark 9 Thermochemical Cycle for Hydrogen Production • 9:20 AM • paper 76c • Richard D. Boardman, Bradley J. Ward, Idaho National Engineering and Environmental Laboratory, Vivek Utgikar*, University of Idaho

Can Sonochemistry Help in Producing Hydrogen Along Thermochemical Cycles? • 9:45 AM • paper 76d • André H. Rahier*, SCK-CEN

Lab-Scale Catalytic Decomposition of Sulfuric Acid with Scalable Materials • 10:10 AM • paper 76e • Fred Gelbard*, Paul S. Pickard, Sandia National Laboratories

Conceptual Design for a Hybrid Sulfur Thermochemical Process Plant • 10:35 AM • paper 76f • Zafar H. Qureshi, Melvin R. Buckner, William Summers, Maximilian B. Gorensek*, Savannah River National Laboratory

Hydrogen Production by Water Dissociation Using Mixed-Conducting Dense Ceramic Membranes • 11:00 AM • paper 76g • Utham Balachandran*, Tae H. Lee, Stephen E. Dorris, Argonne National Laboratory

[77] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Vinings

Hydrogen Purification and Sensing/Leak Detection

James R. Brenner, *Chair*
Florida Tech
William D. Rhodes, *Vice-Chair*
Westinghouse Savannah River Co.

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Composite Pd/Porous Stainless Steel Membranes for the Production of Pure Hydrogen and High Pressure CO_2 for Sequestration • 2:03 PM • paper 77a • Ivan P. Mardilovich, M. Engin Ayturk, Erik E. Engwall, Yi H. Ma*, Federico Guazzone, Worcester Polytechnic Institute

High Temperature, High Pressure Pd-Cu Based Hydrogen Purification in the Presence of CO, CO_2 and H_2O • 2:48 PM • paper 77b • Osemwengie U. Iyoha*, Robert Enick, University of Pittsburgh, Micheal Ciocco, Parsons, Bret Howard, Brian Morreale, Richard P. Killmeyer, National Energy Technology Laboratory

Dense Cermet Membranes for Hydrogen Separation • 3:10 PM • paper 77c • Utham Balachandran*, Ling Chen, Stephen E Dorris, Tae H Lee, Argonne National Laboratory, Brian Morreale, Richard P. Killmeyer, National Energy Technology Laboratory

Sensing Low Concentrations of Hydrogen by Means of Evanescent Wave Absorption in Pd-Coated Optical Fibers • 3:32 PM • paper 77d • David Monzón-Hernández, Donato Luna-

Please note: An asterisk (*) indicates the speaker.

Moreno, Joel Villatoro*, Centro de Investigaciones en Optica A. C., Leon GTO

Optical Fibre Sensors for Hydrogen Leak Detection • 3:54 PM • paper 77e • Alain Trouillet*, University of Saint-Etienne — Lab TSI-CNRS

The Experimental Study and Numerical Simulation of Pd-Alloy Hydrogen Sensor • 4:16 PM • paper 77f • Linfeng Zhang*, Md H. Rahman, Erik McCullen, Ron Baird, Ratna Naik, Golam Newaz, Lajos Rimai, Gregory W. Auner, Simon Ng, Wayne State University

Pd/Anodically Oxidized TiO_2 Sensor Suitable for Detection of H_2 Leakage in Various Environments • 4:38 PM • paper 77g • Yasuhiro Shimizu*, Nagasaki University

Hydrogen Storage as Solidified Ammonia — Breaking the 2015 DOE Barrier • 5:00 PM • paper 77h • Tue Johannessen*, Technical University of Denmark

[81] Monday, April 11, 8:00 AM
Atlanta Marriott Marquis, Marquis Salon 3

Advances in Distillation Simulations & Optimization

Henry Kister, *Chair*
Fluor Corp.
Mike D. Pritchett, *Vice-Chair*
Consultant

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Thermo Savvy for the Distillation Expert • 8:05 AM • paper 81a • Kenneth R. Cox*, Rice University

New Tools for Troubleshooting of Distillation Simulation • 8:35 AM • paper 81b • Stanislaw K. Wasylkiewicz*, Aspen Technology, Inc.

Using Evolutionary Operation (EVOP) to Optimize Distillation Operations • 9:05 AM • paper 81c • Valerie Monical*, Scott Moffatt, Solutia, Inc.

High Mass Transfer Efficiency with Integrated Heat Transfer • 9:35 AM • paper 81d • Anna Lee Tonkovich, Ravi Arora, Tom Hickey, Laura Silva*, Velocys

From Molecular Structure to Distillation Design: The SPEAD Model • 10:15 AM • paper 81e • J. Richard Elliott*, University of Akron

Retrofit Distillation Design Using Shortcut Models for Simulation and Hydraulic Analysis • 10:40 AM • paper 81f • Megan Jobson, Walter Castillo*, University of Manchester

A New Turbulent Model for Computational Mass Transfer and Its Application to Commercial-Scale Distillation Column • 11:05 AM • paper 81g • X G Yuan*, Z.M. Sun, K.T. Yu, Chunjiang Liu, B. T. Liu, Chemical Engineering Research Center

Process and Mechanical Design of Methanol Distillation System • 11:30 AM • paper 81h • Xingang Li, Tao Wang, Jinsheng Sun*, Yufeng Tian, National Engineering Research Center for Distillation Technology

[82] Monday, April 11, 1:30 PM
Atlanta Marriott Marquis, Marquis Salon 3

Advances in Refinery Distillation

Henry Kister, *Chair*
Fluor Corp.
Mike D. Pritchett, *Vice-Chair*
Consultant

Sponsored by
Topical Conference on Distillation

Removing Packings from Heat Transfer Sections of Vacuum Towers • 1:35 PM • paper 82a • Silvia Waintraub*, Glaucia Alves da Silva Torres, Petrobras, Ana Lidia Wild Serpa, Romeu Luis Waschburger, Petrobras/REFAP, Alexander Cramer Von Clausbruch, Bruno de Almeida Barbabela, Chemtech, a Siemens Co.

Revamping a Sequential Distillation Scheme to a Primary Fractionation Scheme • 2:05 PM • paper 82b • Daryl Hanson*, Steve White, Process Consulting Services, Inc., Mark Myers, Rodney Butts, Calument Lubricants Co.

Investigation of an Improved Strategy for Controlling a Multi-Draw Distillation Column

• 2:35 PM • paper 82c • Eric R. Walmet*, Robert S. Coeyman, J. George Hayden, MeadWestvaco

Short-Cut Modeling of Atmospheric and Vacuum Refinery Distillation Columns • 3:05 PM • paper 82d • Megan Jobson, Robin Smith, Vikas Rastogi*, The University of Manchester

Atmospheric and Vacuum Crude Tower Revamp Case Studies • 3:45 PM • paper 82e • Luz N. Hernandez*, Barbara A. Todd, ConocoPhillips

De-Bottlenecking a HF Alkylation Unit by Retrofitting a De-Isobutanizer with VGPlus Trays • 4:15 PM • paper 82f • Giuseppe Mosca*, Sulzer Chemtech Italy

Progress and Improvement of Separation Technique for FCCU Absorption-Stabilization • 4:40 PM • paper 82g • Bin Jiang, Xingang Li, National Engineering Research Center for Distillation Technology, Wenjuan Zhou*, School of Chemical Engineering and Technology, Tianjin, China

CFD-Based Multi-Scale Method for Predicting Mass Transfer Performance in Structured Packing Columns • 5:05 PM • paper 82h • G.U. Fang, Xigang Yuan, Chunjiang Liu*, K. T. Yu, Chemical Engineering Research Center, Tianjin, China

[83] Tuesday, April 12, 8:00 AM Hyatt Regency Atlanta, Centennial II

Reactive and Azeotrope Distillation

Henry Kister, *Chair*
Fluor Corp.
Mike D Pritchett, *Vice-Chair*
Consultant

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Topical Conference on Distillation

Nonlinear Model Predictive Control of a Reactive Distillation Column • 8:05 AM • paper 83a • Rohit Kawathekar, James Riggs*, Texas Tech University, Dept. of Chemical Engineering

A Novel Concept: Semicontinuous Reactive Distillation • 8:35 AM • paper 83b • Thomas A. Adams*, Warren D. Seider, University of Pennsylvania

Pressure Sensitivity in Distillation — Implications for Control Structure • 9:05 AM • paper 83c • Sten B. Jorgensen*, Technical University of Denmark

Evaluation of the Separation Efficiency of Three-Phase Operated Packed Towers • 9:35 AM • paper 83d • Olivier Villain*, Jens-Uwe Repke, Günter Wozny, Technical University of Berlin

Crossing Distillation Boundaries in Synthesis of Separation Sequences for Azeotropic Mixtures • 10:15 AM • paper 83e • Stanislaw K. Wasylkiewicz*, Aspen Technology, Inc.

A General Rate-Based Model for Industrial Reactive Absorption and Desorption Processes in Sour Gas Treatment • 10:40 AM • paper 83f • Günter Wozny, Berthold Diekjakobs, Robin Thiele*, Jens-Uwe Repke, Technical University of Berlin, Holger Thielert, ThyssenKrupp Uhde GmbH

Heterogeneously Catalyzed Synthesis of n-Butyl Acetate: Reaction Kinetics, Side Reactions and Application to Reactive Distillation • 11:05 AM • paper 83g • Sandra Parada*, Sergej Blagov, Hans Hasse, Institute of Thermodynamics and Thermal Process Engineering, University of Stuttgart, Germany, Oliver Bailer, Sulzer Chemtech Ltd.

Solubility of Formaldehyde and Trioxane in Aqueous Solutions • 11:30 AM • paper 83h • Thomas Grutzner*, Hans Hasse, Institute of Thermodynamics and Thermal Process Engineering, University of Stuttgart

[84] Tuesday, April 12, 1:30 PM Hyatt Regency Atlanta, Centennial II

High-Capacity Trays and Packing

Henry Kister, *Chair*
Fluor Corp.
Mike D Pritchett, *Vice-Chair*
Consultant

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Push Valve Experience on Distillation Trays • 1:35 PM • paper 84a • Daniel R. Summers*, Sulzer Chemtech USA, Inc.

Control of Liquid Flow on Sieve Trays • 2:00 PM • paper 84b • Tony Cai, G. X. Chen*, Fractionation Research Inc.

Tips for the Successful Design and Installation of Cartridge Trays • 2:30 PM • paper 84c • Ruth R. Sands*, DuPont Engineering Technology

Modeling the Minimum Entrainment on Sieve Tray • 3:00 PM • paper 84d • Shuzo Ohe*, Science University of Tokyo

Advances in Styrene Fractionation with INTALOX® Packed Tower Systems: Part 1 - Column Internals • 3:45 PM • paper 84e • Randall A. Sommerfeldt*, Gail Hausch, Christoph Ender, Koch-Glitsch, LP

Design Guidelines for Distillation Columns in Ethyl-benzene and Styrene Monomer Service • 4:10 PM • paper 84f • Timothy M. Zygula, OVA Chemicals, Tau Yee Lim, Krishnamoorthy Senthil, Wai Kiong Ng, Karl Kolmentz*, Sulzer Chemtech Pte. Ltd., Andrew Sloley, VECO USA, Mike Hightower, Sandia National Laboratory

Study of Intermediate Reboilers and Condensers for Distillation Columns for Binary Systems • 4:40 PM • paper 84g • Martin Carlsson, Ashok V. Naimpally*, Osman Jance, Matt Keating, Romit N. Ketkar, California State University, Long Beach

Novel Column Internals and Their Application in China • 5:05 PM • paper 84h • Jinsheng Sun*, Xingang Li, Tao Wang, Yufeng Tian, National Engineering Research Center for Distillation Technology, Tianjin, China

[85] Wednesday, April 13, 8:00 AM Hyatt Regency Atlanta, Centennial II

New and Exciting Packing Applications

Henry Kister, *Chair*
Fluor Corp.
Mike D Pritchett, *Vice-Chair*
Consultant

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Mellagrid 64.X testing at FRI • 8:05 AM • paper 85a • Mark Pilling*, Sulzer Chemtech USA, Inc.

Identify Liquid Maldistributions in Packed Distillation Towers by CAT-Scan Technology • 8:35 AM • paper 85b • William Mixon*, Simon Xu, Quest TruTec LP

A New Method to Assess Liquid Distributor Quality • 9:05 AM • paper 85c • Lothar Spiegel*, Sulzer Chemtech Ltd.

Hyperfil® Knitted Mesh Tower Packing — A Pioneer in the Past/A High Efficiency Leader for the Future • 9:30 AM • paper 85d • Martyn Cooling, KnitMesh Ltd., Mark Neuman*, Enhanced Separation Technologies, LLC

Advances in Styrene Fractionation with INTALOX® Packed Tower Systems: Part 2 — FLEXIPAC® HC® Structured Packing • 10:15 AM • paper 85e • Randall A. Sommerfeldt, Gail Hausch*, Izak Nieuwoudt, Koch-Glitsch, LP

Modeling and Validation of Random Packing Hydraulics • 10:40 AM • paper 85f • Florian Kehrer, Lothar Spiegel, Peter Choo*, Sulzer Chemtech Ltd.

Comparison of Packings for Absorption with High Liquid Loading • 11:05 AM • paper 85g • W. Y. Fei*, X. Y. Song, Dept. of Chemical Engineering, Beijing, China

Comparison of Liquid Distribution Performances of Conventional and High Capacity Structured Packings • 11:35 AM • paper 85h • Zarko Olujic*, Delft University of Technology

[86] Wednesday, April 13, 1:30 PM Hyatt Regency Atlanta, Centennial II

Distillation Troubleshooting (The Dick Harris Memorial Session)

Henry Kister, *Chair*
Fluor Corp.
Mike D. Pritchett, *Vice-Chair*
Consultant

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Solution Foaming in Gas/Liquid Treating Towers • 1:40 PM • paper 86b • Steve Von Phul*, D-Foam

Retrofit of a H_2S Selective Amine Absorber Using Mellapak Plus Structured Packing • 2:10 PM • paper 86c • Glenn Shiveler*, Sulzer Chemtech USA, Inc., Geronimo Sixtos, Sulzer Chemtech Mexico

Radioisotope Technology — Benefits & Limitations in Troubleshooting Packed Beds in Vacuum Distillation • 2:40 PM • paper 86d • Scott Vidrine*, Paul Hewitt, Tracerco

Component Trapping in Distillation Towers: Causes, Symptoms and Cures • 3:10 PM • paper 86e • Henry Kister*, Fluor Corp.

Scan/Simulation Integrated Diagnostics for Distillation Improvement • 3:55 PM • paper 86f • Simon Xu*, Quest TruTec LP

Trapped Components in Distillation Columns: Sometimes Changing Operating Conditions Can Solve Your Problem • 4:25 PM • paper 86g • Soundar Ramchandran*, Solutia, Inc.

Troubleshooting an Ethylene Quench Water Column • 4:55 PM • paper 86h • Timothy M. Zygula*, OVA Chemicals, Donna Fruge, Westlake Group, Randall A Sommerfeldt, Koch-Glitsch, LP

Please note: An asterisk (*) indicates the speaker.

Strategies of Successful Distillation Equipment Revamps Part 1: Determining Existing Distillation Equipment Capacities • 5:20 PM • paper 86i • Daniel R. Summers, Sulzer Chemtech USA, Inc., Peter W. Faessler, Karl Kolmentz*, Wai Kiong Ng, Sulzer Chemtech Pte. Ltd., Ryan Pitt, Westlake Group

[87] Monday, April 11, 10:15 AM Hyatt Regency Atlanta, International South

Inerting of Reactors and Process Equipment

Raymond Freeman, *Chair*
ABS Consulting
Joseph R. Natale, *Vice-Chair*
Baker Engineering & Risk Consultants

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Inerting, a Reliable and Effective Preventive Measure Against Explosions • 10:25 AM • paper 87a • Norbert H Jaeger*, Ciba Specialty Chemicals Ltd.

Using Limiting Air Pressure (LAP) as an Alternative to Inertion in Rotary Dryers • 10:55 AM • paper 87b • Les Cunningham, Michael J. Toth*, Dan Muzzio, Merck & Co., Inc.

Loss of Inerting Due to Multiple Exhaust Vents • 11:20 AM • paper 87c • J. Kelly Thomas*, Donald E. Ketchum, Quentin A. Baker, Baker Engineering & Risk Consultants

Inerting of Centrifuges for Safe Operation • 11:45 AM • paper 87d • Stanley S. Grossel*, Process Safety & Design, Inc.

[88] Monday, April 11, 1:45 PM Hyatt Regency Atlanta, International South

Chemical Reactivity Hazards

Robert W. Johnson, *Chair*
Unwin Co.
Brian Dunbobbin, *Vice-Chair*
Air Products & Chemicals Inc.

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Missed Opportunities in Reactive Chemical Hazard Evaluations • 1:55 PM • paper 88a • Russell A. Ogle*, Exponent, Inc.

Rapid Reactivity Screening Using a Nanocalorimeter • 2:20 PM • paper 88b • Yen-Shan Liu*, Victor M. Ugaz, Texas A&M University, Sanjeev R. Saraf, ioMosaic, William J. Rogers, M. Sam Mannan, Mary Kay O'Connor Process Safety Center

Reactivity Investigation of Mixtures of Propane and Nitrous Oxide • 2:45 PM • paper 88c • Ronald J. Willey*, Shangwei Hu, Northeastern University, John Moses, CF Technologies, Inc.

Chemical Reactivity Hazards and Inherently Safer Technology • 4:00 PM • paper 88d • Bob Venugopal*, Chilworth Technology, Inc.

Rapid Identification of Reactivity Hazards in a Multi-Use Facility • 4:30 PM • paper 88e • David J. Leggett*, Leggett

The NOAA Chemical Reactivity Worksheet, Past, Present, and Future • 4:55 PM • paper 88f • James K. Farr, U.S. National Oceanic and Atmospheric Administration, Wade A. Freeman*, University of Illinois at Chicago

[89] Tuesday, April 12, 8:00 AM Hyatt Regency Atlanta, International South

Fire and Explosions

Erdem A .Ural, *Chair*
Loss Prevention Science and Technologies, Inc.
Christopher Hanauska, *Vice-Chair*
Hughes Associates, Inc.

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Fire and Explosions in the Manufacturing Industry: Data from the Hazardous Substances Emergency Events Surveillance (HSEES), 1996-2001 • 8:10 AM • paper 89a • Zahava Berkowitz*, D. K. Horton, Wendy E. Kaye, Agency for Toxic Substances and Disease Registry

Prediction of Minimum Flash Point Behavior for Binary Mixtures • 8:35 AM • paper 89b • M. Sam Mannan, William J. Rogers, Mary Kay

O'Connor Process Safety Center, Migvia del C. Vidal*, Texas A&M University

Buoyant Gas Layer Deflagration Effects • 9:00 AM • paper 89c • Robert Zalosh*, Jamie Stern-Gottfried, Worcester Polytechnic Institute

BLEVE Blast by Expansion-Controlled Evaporation • 10:15 AM • paper 89d • Jaap Weerheijm, Nico H. A. Versloot, Martijn M. Van der Voort*, Albert C. Van den Berg, TNO Prins Maurits Laboratory

Modeling the Consequences of Bursting Vessels Inside Enclosed Structures Using Wall Failure Criteria • 10:45 AM • paper 89e • David D. Herrmann*, DuPont

Design Considerations in Dust Explosion Inerting and Suppression • 11:10 AM • paper 89f • Ashok G. Dastidar, Safety Consulting Engineers, Inc., John E. Going, Fike Corp., Faisal I Khan, Memorial University of Newfoundland, Paul R. Amyotte*, Dalhousie University

Barrier Spacing to Prevent Explosion Propagation in Ducts • 11:35 AM • paper 89g • Joseph A. Senecal*, Henry Garzia, Kidde-Fenwal, Inc.

[90] Tuesday, April 12, 1:45 PM Hyatt Regency Atlanta, International South

Process Hazards In The Pharmaceutical Industry

Stanley S. Grossel, *Chair*
Process Safety & Design, Inc.
Larry Floyd, *Vice-Chair*
Ciba Specialty Chemicals Corp.

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Containment of Potent Pharmaceutical Compounds: A Risk Based • 1:55 PM • paper 90a • Brian D. Moore*, Eli Lilly and Co.

Low Temperature Oxidation of Methanol in the Presence of Sponge Nickel Leads to Filter Overpressure Incident • 2:20 PM • paper 90b • Edward M. Davis*, Eli Lilly and Co.

A Method to Determine if a Flowing Suspension Might Cause Electrostatic Damage to the Glass/TFE Liner of Steel Equipment • 2:45 PM • paper 90c • Daniel Muzio*, Michael J. Toth, Merck & Co., Inc.

A Safe and Practical Procedure to Prepare Ethyl Diazoacetate • 4:00 PM • paper 90d • William Merkl, Atul S. Kotnis, James H. Simpson, Steve S. Y. Wang*, Bristol-Myers Squibb

Pfizer&#8217s Global Approach for Reducing Risks for Hydrogenation Operations • 4:30 PM • paper 90e • Cigdem F. Karayigitoglu*, Pfizer Inc., John Holroyde, Pfizer Global Manufacturing

Effectively Managing Change in Pharmaceutical Processes • 4:55 PM • paper 90f • Shane Thornton*, Ciba Specialty Chemicals

[91] Wednesday, April 13, 8:00 AM Hyatt Regency Atlanta, International South

Dust Explosions

John F Murphy, *Chair*
U.S. Chemical Safety Board
Dennis Hendershot, *Vice-Chair*
Rohm and Haas Co.

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Back To The Basics In Dust Explosions • 8:10 AM • paper 91a • David C. Kirby*, Baker Engineering & Risk Consultants, David Wechsler, The Dow Chemical Co.

Dust Explosion Scenarios and Assessments in the New CCPS Guidelines for Safe Handling of Powders and Bulk Solids • 8:35 AM • paper 91b • Robert Zalosh*, Worcester Polytechnic Institute, Stanley S. Grossel, Process Safety & Design, Inc., Russ Kahn, Syngenta Crop Protection, Inc., Daniel Sliva, CCPS

Investigation into a Dust Explosion at an Automotive Insulation Supply Facility in Corbin Kentucky • 9:00 AM • paper 91c • Stephen Wallace*, U.S. Chemical Safety Board

Evaluation Of Dust And Hybrid Explosion Potential In Process Plants • 10:15 AM • paper 91d • Ashok G. Dastidar*, C. James Dahn, Safety Consulting Engineers, Inc.

Dust Deflagration Venting Through Ducts • 10:45 AM • paper 91e • Erdem A. Ural*, Loss Prevention Science and Technologies, Inc.

Combustible Dust Hazard Study • 11:10 AM • paper 91f • Bill Hoyle, Angela Blair*, U.S. Chemical Safety Board

Discussion on Dust Hazard Study • 11:35 AM • paper 91g • Bill Hoyle, Angela Blair*, U.S. Chemical Safety Board

[92] Wednesday, April 13, 1:45 PM Hyatt Regency Atlanta, International South

Case Histories and Lessons Learned — Joint Session (LPS and PPSS)

Henry L. Febo, *Chair*
FM Global
David G. Clark, *Vice-Chair*
The DuPont Co.

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Insidious Explosion Hazards in the Mining Industry • 1:55 PM • paper 92a • Steven J. Luzik*, Derrick Tjernlund, Mine Safety and Health Administration

Two Large Losses: Refinery Fire and Vapor Cloud Explosion at a Natural Gas Processing Plant • 2:20 PM • paper 92b • Jeffrey Yuill*, Starr Technical Risks Agency, Inc.

U.S. Chemical Safety Board Investigation: Positive Pressure Control Room Failure • 2:45 PM • paper 92c • Lisa Long*, Johnnie Banks, U.S. Chemical Safety Board

[93] Monday, April 11, 10:15 AM Hyatt Regency Atlanta, Cairo/Hong Kong

Human Factors Engineering and Ergonomic Engineering — Part I

Don Lorenzo, *Chair*
ABS Consulting
Lawrence J. H. Schulze, *Vice-Chair*
University of Houston

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Comparison of Male and Female Torque Production Capabilities During Valve Handwheel Operations and Implications for Process Facility Design • 10:25 AM • paper 93a • Lawrence J. H. Schulze*, University of Houston

Human Factors Analysis Techniques For Process Control Rooms and Control Systems • 10:55 AM • paper 93b • Dennis Attwood*, RRS Engineering

Statistical Analysis of Human Factors Checklists • 11:20 AM • paper 93c • Bruce K. Vaughen*, DuPontTeijinFilms

Principles for Reducing Human Error • 11:49 AM • paper 93d • Don Lorenzo*, ABS Consulting

[94] Monday, April 11, 1:45 PM Hyatt Regency Atlanta, Cairo/Hong Kong

Human Factors Engineering and Ergonomic Engineering — Part II

Don Lorenzo, *Chair*
ABS Consulting
Lawrence J. H. Schulze, *Vice-Chair*
University of Houston

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Human Reliability Analysis for Chlorine Bulk Unloading Procedures • 1:45 PM • paper 94a • Joseph J. Chaback*, Tulsa County LEPC

[95] Monday, April 11, 2:15 PM Hyatt Regency Atlanta, Cairo/Hong Kong

Improving Safety Culture

M. Sam Mannan, *Chair*
Mary Kay O'Connor Process Safety Center
William J. Rogers, *Vice-Chair*
Mary Kay O'Connor Process Safety Center

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Safety Climate: It's not Just an Engineering Problem • 2:35 PM • paper 95a • Mindy E. Bergman*, Jaime B. Henning, Stephanie C. Payne, Texas A&M University

Operational Discipline at DuPont • 3:05 PM • paper 95b • James A. Klein*, David Cummings, DuPont

Values and Behavior: Building a Culture that Promotes Safety • 3:35 PM • paper 95c • Terry E. McSween*, Quality Safety Edge

Integrated Management Systems and Safety Culture • 4:10 PM • paper 95d • Robert Walter*, AntiEntropics, Inc.

Essential Elements of a Sound Safety Culture • 4:40 PM • paper 95e • Walt L. Frank*, ABS Consulting

[96] Tuesday, April 12, 8:00 AM Hyatt Regency Atlanta, Cairo/Hong Kong

Risk Assessment

Philip M. Myers, *Chair*
Advantage Risk Solutions, Inc.
Michael Livingston, *Vice-Chair*
WS Atkins

Please note: An asterisk (*) indicates the speaker.

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Process Plant Safety Symposium
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An Enhanced Layer of Protection Analysis (LOPA) Method • 8:10 AM • paper 96a • Alvin Waller*, FMC Corp.

Selection and Evaluation of Release Scenarios for an LNG Import Terminal • 8:35 AM • paper 96b • Jeffrey D. Marx*, John B. Cornwell, Quest Consultants Inc.

Criteria for the Escalation of Fires and Explosions • 9:00 AM • paper 96c • Valerio Cozzani*, Universita di Bologna, Gianfilippo Gubinelli, Universita degli Studi di Pisa, Ernesto Salzano, CNR — Institute of Research on Combustion

Quantitative Risk Analysis for Hazardous Materials Transportation • 10:15 AM • paper 96d • Yuanhua Qiao*, William J. Rogers, M. Sam Mannan, Mary Kay O'Connor Process Safety Center

Statistical Analysis of Pressure Vessel Failure • 10:45 AM • paper 96e • Ahmad Shafaghi*, Thomas J. Mikschl, ABS Consulting

Atlantis Case Study: Getting the Most from Your HAZOP • 11:10 AM • paper 96f • Donnie J. Carter*, BP America Inc., Kevin Watson, Unocal, Mary Gerschefski, W.S. Atkins

Operator Initiated Action as an Independent Protection Layer • 11:35 AM • paper 96g • Scott Sandler, Angela Summers*, SIS-Tech Solutions

[97] Tuesday, April 12, 1:45 PM
Hyatt Regency Atlanta, Cairo/Hong Kong

Incident Investigations and Methods of Interpreting Evidence

Lisa M. Morrison, *Chair*
Don Connolley, *Vice-Chair*
Akzo Nobel Chemicals Inc.

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The Transmitters Are Leaking in One Unit, But Are Working Fine in Another Unit, or Why Didn't the First Fixes Work? • 1:55 PM • paper 97a • Arthur M. Dowell*, Rohm and Haas Co.

Incident Investigation of an Explosion at a Styrene Plant • 2:20 PM • paper 97b • Dan Wiff*, NOVA Chemicals, Inc.

Investigating Complex Chemical Plant Accidents • 2:45 PM • paper 97c • Russell A Ogle*, Exponent, Inc.

The Investigation Challenges of the Kinston Dust Explosion Accident • 4:00 PM • paper 97d • Quentin A. Baker*, Michael A. Polcyn, Baker Engineering & Risk Consultants, Robert C .Gombar, James A. Lastowka, McDermott Will & Emery LLP

Investigating Explosion Incidents — What Do You Look for and What Does It Tell You • 4:30 PM • paper 97e • Darrell D. Barker*, ABS Consulting

Dust Explosion Case Study: How a "Wrong" Material of Construction Caused a Dust Explosion • 4:55 PM • paper 97f • Dehong Kong*, Chilworth Technology, Inc.

[98] Wednesday, April 13, 8:00 AM
Hyatt Regency Atlanta, Cairo/Hong Kong

Inherently Safer Process Design and Operations

Jack Chosnek, *Chair*
KnowledgeOne
Vic Edwards, *Vice-Chair*
Aker Kvaerner

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Application of Inherently Safer Process Concepts in DuPont • 8:10 AM • paper 98a • Curtis C. Clements*, DuPont Engineering Technology

Inherently Safer Upstream Oil and Gas Processing • 8:35 AM • paper 98b • David G. Kehn*, Mustang Engineering

Dow's Use of Inherently Safer Technology • 9:00 AM • paper 98c • Tim Overton*, George King, Dow Chemical

Sub-Atmospheric Pressure Storage and Delivery For Gases • 10:15 AM • paper 98d • Joseph Arno, Luping Wang, Karl Olander*, ATMI, Inc.

Implementing Inherently Safer Design in an Existing Plant • 10:45 AM • paper 98e • Dennis Hendershot*, Rohm and Haas Co., Jonathan A. Sussman, University of Pennsylvania, Gerald E. Winkler, G. Lee Dill, Rohm and Haas Co.

Continuous Process Improvement Toward a Safer Ester Amidation Process • 11:15 AM • paper 98f • David J. Kacsur, Adrian David*, Jing Liang, Lucius T. Rossano, Karen L. Tenhuisen, Srinivas Tummala, Boguslaw M Mudryk, Bristol-Myers Squibb Co.

[102] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Dunwoody

LNG I — Plant & Operation

Yu-Nan Liu, *Chair*
Air Products & Chemicals Inc.
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**
Co Sponsored by **16e — New Technology and Developments**

Mixed Fluid Power Rankine Cycle using LNG as Heat Sink with LPG Extraction • 8:00 AM • paper 102a • John Mak*, Curt Graham, Richard B. Nielsen, Fluor Enterprises, Inc.

Pressurized LNG Facilities Advantages • 8:30 AM • paper 102b • Eric D. Nelson*, Ron R. Bowen, Ann T. Leger, Mark C. Gentry, Exxon-Mobil Upstream Research Co.

Badak's Utility System to Support a High Reliability LNG/LPG Plant Operation-Present and Future • 9:00 AM • paper 102c • Yudi Siswadi*, Soewignyo, PT. Badak NGL Bontang

World Largest Acid Gas Incinerator in LNG Plant: Startup and Operational Experiences • 9:30 AM • paper 102d • S. Jamaludin*, Malaysia LNG Sdn. Bhd, Tg Kidurong, Sarawak

The Shell PMR Process for Large Capacity LNG Trains • 10:00 AM • paper 102e • Barend J. B. Pek, Jolinde M. Van de Graaf*, Shell Global Solutions International B.V.

A Technical and Economic Comparison Between 9% Nickel and Cryogenic Concrete for Primary LNG Containment • 10:30 AM • paper 102f • Paul V. Sullivan*, Whissoe Oil & Gas

[103] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Dunwoody

LNG II — Technology & Equipment

Yoshitsugi Kikkawa, *Chair*
Chiyoda Corp.
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**

Improved Design of Mixed Refrigerant Cycles Using Genetic Algorithm • 2:00 PM • paper 103a • Frank L. Del Nogal*, Jin-Kuk Kim, Simon J. Perry, Robin Smith, The University of Manchester

Baseload LNG Production in Xin Jiang — A Remote Source of Clean Energy for New Gas Consumers in China • 2:25 PM • paper 103b • Xiang Dong, Xin Jiang Guanghui Liquefied Natural Gas Development Co. Ltd., Eginhard Berger*, Linde AG - Linde Engineering Div., Albert Meffert, Tractebel Gas Engineering, Li Wei Bin, SINOPEC Shanghai Engineering Co. Ltd.

Optimal Process Location for NGL Recovery in LNG Plant • 2:50 PM • paper 103c • Douglas Attaway*, Stanley Huang, Heinz Kotzot, Charles Durr, KBR

Benefits of Integrating NGL Extraction and LNG Liquefaction Technology • 3:15 PM • paper 103d • Jong Juh Chen, Doug Elliott, R. J. Lee, Jame Yao, IPSI LLC, Wesley R. Qualls*, Shawn Huang, ConocoPhillips Co.

Monitoring LNG Expanders Using No-Load and Orifice Characteristics • 3:40 PM • paper 103e • Hans Kimmel*, Ebara International Corp., Chen-Hwa Chiu, ChevronTexaco

The Current Status of LNG Standards and Regulations • 4:05 PM • paper 103f • Myron L. Casada*, Donald Norton, ABSG Consulting

Operating Experiences with Selective Catalytic Reduction Systems (SCR) Operating with Submerged Combustion Vaporizers (SCV) at a North American Baseload LNG Vaporization Facility • 4:30 PM • paper 103g • David Hawkins*, BDT Engineering

[104] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Lenox

Gas Conversion to Liquid Fuels and Related Advanced Fuels

Dexter F. Sutterfield, *Chair*
National Energy Technology Laboratory, U.S. Department of Energy
Rameshwar D. Srivastava, *Vice-Chair*
NETL/DOE
Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**
Co Sponsored by **16a — Petroleum**

ITM Syngas: Ceramic Membrane Technology for Lower Cost Conversion of Natural Gas • 8:30 AM • paper 104a • Christopher M. Chen*, Douglas L. Bennett, Michael F. Carolan, Air Products and Chemicals, Inc., Dale M. Taylor, Merrill A. Wilson, Ceramatec Inc., Theodore R. Ohrn, SOFCo-EFS Holdings LLC

C1 Catalytic Partial Oxidation Over Short-Contact-Time Reactors: Methane to Synthesis Gas • 8:55 AM • paper 104b • James E. Miller*, William A. Steen, Anthony H. McDaniel, Steven F. Rice, Sandia National Laboratories, Vasilis Papavassiliou, Praxair, Inc., Pauline Ho, Reaction Design, Inc.

Choosing the Proper Technology to Monetize Large, Remote Gas Reserves • 9:20 AM • paper 104c • Robert M. Lesnick, Dan H. Brannon*, ConocoPhillips

Enabling Offshore Production with Microchannel Process Technology Systems • 9:45 AM • paper 104d • Terry Mazanec*, Francis P. Daly, Tad Dritz, Velocys, Inc.

Fischer-Tropsch Synthesis: Impact of Water on Iron and Cobalt Catalysts During Synthesis • 10:10 AM • paper 104e • Mingsheng Luo, Gary Jacobs, Karuna Chaudhari, Burtron H. Davis*, Tapan K. Das, Center for Applied Energy Research

High Conversion Efficiency Reactor for Offshore Production of Methanol • 10:35 AM • paper 104f • Francis P. Daly*, Terry Mazanec, Velocys, Inc.

[105] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Dunwoody

LNG III — Environment & Energy

Harry H. West, *Chair*
Texas A&M University
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**

Benzene Crystallisation Risks in LNG Processes • 8:30 AM • paper 105a • Jean-Charles De Hemptinne*, IFP

Predicting Environmental Impacts on Multi-train LNG Facility Using Computation Fluid Dynamics (CFD) • 8:55 AM • paper 105b • Philip Diwakar, Dan Lin, Vibhor Mehrotra, Wing Kong Yee*, Bechtel Corp.

LNG Vaporization Technology: The Environment vs. Energy Sources • 9:20 AM • paper 105c • Lyn Himmelberger*, Patrick Billman, Cryoquip, Inc.

Air Emission Control Technologies for Submerged Combustion Vaporizers • 9:45 AM • paper 105d • Judy Wong, Gary Reeves, Kamal Shah*, Aker Kvaerner, Inc.

Limitations in LNG Vaporization Process Selection • 10:10 AM • paper 105e • Joseph Cho*, Gopal Marthur, Heinz Kotzot, Charles Durr, KBR

Soot and Coke Formation in Regeneration Gas Heaters and Impacts on Downstream Operations • 10:35 AM • paper 105f • Siti Rafidah Moslim*, Malaysia LNG Sdn. Bhd

LNG Vapor Cloud Exclusion Zones for Spills into Impoundments • 11:00 AM • paper 105g • Tom Spicer, Jerry Havens*, Chemical Hazards Research Center,Dept. of Chemical Engineering, University of Arkansas

[106] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Lenox

Conversion of Natural Gas to Hydrogen

Douglas L. Bennett, *Chair*
Air Products & Chemicals Inc.
Venkat Venkataraman, *Vice-Chair*
NETL/DOE

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Co Sponsored by **16c — Gas**

Kinetic Aspects of Boosting Hydrogen Production by Means of Methanol • 2:00 PM • paper 106a • Charlotte V. Ovesen*, P. E. Hojlund Nielsen, John Bogild Hansen, Niels Christian Schiodt, Haldor Topsøe

A Novel Thermochemical Conversion Process for Distributed Hydrogen Production from Natural Gas and Other Fuels • 2:25 PM • paper 106b • Rachid B. Slimane*, James L. Aderhold, Jr., Gas Technology Institute

Please note: An asterisk (*) indicates the speaker.

Developing Structural Property Relationships of Pt/Ceria Catalysts for Low Temperature Water Gas Shift • 2:50 PM • paper 106c • Gary Jacobs*, Center for Applied Energy Research

Partial Oxidation of Methane on Ni-MgO Catalysts • 3:15 PM • paper 106d • Abolghasem Shamsi*, DOE-NETL, James J. Spivey, Louisiana State University

Non-Oxidative Conversion of Methane to Hydrogen in a DC Plasma Reactor • 3:40 PM • paper 106e • Christopher L. Gordon*, Lance L. Lobban, Richard G. Mallinson, University of Oklahoma, School of Chemical Engineering

Biological Processing of Carbonaceous Sources Using Extremophiles for CO_2-Neutral Ultra-Pure Hydrogen Production • 4:05 PM • paper 106f • Mojgan Anjom, Stony Brook University, Bin Dong, Daniel Van der Lelie, Safiyh Taghavi, Devinder Mahajan*, Brookhaven National Laboratory, Suellen A. Van Ooteghem, BioHydroGenesys, Inc.

[107] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Dunwoody

LNG IV — Control & Simulation

Hans Kimmel, *Chair*
Ebara International Corp.
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**

Advancements in Compressor Antisurge Control Valve Solutions • 2:00 PM • paper 107a • John P. Wilson*, Emerson Process Management – Fisher Controls

Non-Linear Oscillations in LNG Liquid-Vapor Two-Phase Flows • 2:30 PM • paper 107b • Andrew Kimmel*, University of Nevada

Process Understanding and Control Approach of Separator Column Coupled With Overhead Compressor: Lessons Learnt From Malaysia LNG Tiga • 3:00 PM • paper 107c • S Jamaludin*, Malaysia LNG Sdn. Bhd.

Modeling and Dynamic Simulation as Design Tools for LNG Plants • 3:30 PM • paper 107d • Paul Hahn, ConocoPhillips Co., Dave Messersmith, Vibhor Mehrotra, Ramachandra Tekumalla, Jaleel Valappil, Carlos M. Yengle*, Bechtel Corp.

Controlling Complex Turbomachines in LNG Plants • 4:00 PM • paper 107e • Krishnan Narayanan*, Compressor Controls Corp.

Optimizing LNG Expander Performance Across the System Resistance • 4:30 PM • paper 107f • Christian Fischer*, Shell Sakhalin Energy SE-LNG, Hans Kimmel, Ebara International Corp.

[108] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Dunwoody

LNG V — Cost & Facilities

Joseph Cho, *Chair*
KBR
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**

Offshore LNG Receiving Terminal Facilities that Optimize LNG Shipping Operations • 8:30 AM • paper 108a • Lance Van Anglen, Craig Taylor, Freedom LNG, Craig Jackson, Golar Shipping, James Davis*, Paragon Engineering Services, Inc.

Natural Gas Liquefaction Process Selection for Emerging Markets • 8:55 AM • paper 108b • Michael A. Barclay*, Noel Denton, Foster Wheeler Energy Ltd.

Gas Commercialization Costs — On the Way Up • 9:20 AM • paper 108c • Devendra Agrawal*, Marathon Oil

LNG Plant Costs — Past and Present Trends and a Look at the Future • 9:45 AM • paper 108d • Robert N. DiNapoli*, Charles C. Yost, Merlin Associates

CryoEnergy from LNG Regasification to Pipeline Specification • 10:10 AM • paper 108e • Alexandre Rojey, Beatrice Fischer, Pierre Boucot, Ari Antero Minkkinen*, IFP

Challenges of LPG Supply to the Nigerian Domestic Market • 10:35 AM • paper 108f • N. John Erinne*, Chex & Associates

LNG Expander for Extended Operating Range in Large-Scale Liquefaction Trains • 11:00 AM • paper 108g • Joel Madison*, Hans Kimmel, Ebara International Corp.

[109] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Dunwoody

LNG VI — Risk & Safety

Harry H. West, *Chair*
Texas A&M University
Chen-Hwa Chiu, *Vice-Chair*
ChevronTexaco

Sponsored by **5th Topical Conference on Natural Gas Utilization**
Co Sponsored by **16c — Gas**

Consequences of Underwater Releases of LNG • 2:00 PM • paper 109a • Robin M. Pitblado, John Baik, DNV (USA) Inc., Dennis Butts*, Det Norske Veritas

Large LNG Fire Thermal Radiation — Modeling Issues & Hazard Criteria Revisited • 2:25 PM • paper 109b • Phani K. Raj*, Technology & Management Systems, Inc.

QRA of a Typical LNG Re-Gasification Facility — What are the Historical Main Contributors to 3rd Party Risk? • 2:50 PM • paper 109c • Tor Egil Nielsen*, Scandpower Risk Management, Inc.

Quantitative Risk Evaluations of Apparatuses and Equipment of LNG Plant, and Specific Evaluation Methods • 3:15 PM • paper 109d • Masafumi Katagiri, Akenori Makita, Takashi Sanjo, Kazu Sato, Nihonkai LNG Co. Ltd., Shigemi Ochiai*, Jonquil Consulting Inc.

LNG Codes vs. Process Safety Standards • 3:40 PM • paper 109e • C. Dale Zinn*, Consulting Engineer

LNG Fire Fighting at Texas A&M: Training and Research • 4:05 PM • paper 109f • Harry H. West*, Texas A&M University, M. Sam Mannan, Mary Kay O'Connor Process Safety Center, Kirk Richardson, Mike Wisby, Texas A&M Fire School

Safety Implications of a Large LNG Spill Over Water • 4:30 PM • paper 109g • Mike Hightower*, Sandia National Laboratory

[117] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, University

Tutorial — Energy-Water Nexus in the Process Industry

C. B. Panchal, *Chair*
Argonne National Laboratory
Peter R. Pujado, *Vice-Chair*
UOP LLC

Sponsored by **Energy Efficiency for a Sustainable Economy**

Energy-Water Nexus and the Process Industry • 8:00 AM • paper 117a • John R. Gasper*, Argonne National Laboratory

[118] Monday, April 11, 9:30 AM Hyatt Regency Atlanta, University

Tutorial — Advances in Fluidization of Energy Systems

Ronald W. Breault, *Chair*
U.S. DOE, National Energy Technology Lab
V. K. Mathur, *Vice-Chair*
University of New Hampshire,
Dept. of Chemical Engineering

Sponsored by **Energy Efficiency for a Sustainable Economy**

[119] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Marietta

Mass and Heat Transport in Fluidized Bed Energy Systems

Ronald W. Breault, *Chair*
U.S. DOE, National Energy Technology Lab
Thomas Ho, *Vice-Chair*
Lamar University

Sponsored by **Energy Efficiency for a Sustainable Economy**

A Mass Transfer-Based Kinetic Model for Simulating a Microwave-Heated Fluidized Bed Mercury Desorber • 2:05 PM • paper 119a • Jerry Lin, Jack R. Hopper, Anand Makhija, Thomas Ho*, Tae-Hoon Kim, Lamar University

Sensitivity of Gas-Solids Dispersion and Mass Transfer Coefficient in an Eulerian-Eulerian CFD Model • 2:30 PM • paper 119b • Ronald W. Breault, Chris P. Guenther*, U.S. DOE, National Energy Technology Lab

Mass Transfer in Circulating Fluidized Beds • 2:55 PM • paper 119c • Ronald W. Breault*, U.S. DOE, National Energy Technology Lab, Rex Compston, ORISE

Enhanced Productivity of Chemical Processes Using Dense Fluidized Beds • 3:20 PM • paper 119d • Sibashis S. Banerjee*, Millennium Chemicals

[120] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, University

Renewable Sources of Energy I

V. K. Mathur, *Chair*
University of New Hampshire,
Dept. of Chemical Engineering
Gerald R. Nix, *Vice-Chair*
National Renewable Energy Laboratory

Sponsored by **Energy Efficiency for a Sustainable Economy**

Numerical Investigation of Water and Thermal Management in PEM Fuel Cells • 2:05 PM • paper 120a • Jinquan Xu*, M. Yousuff Hussaini, Florida State University

Carbon Textiles and Their Use in Fuel Cell Gas Diffusion Layers • 2:35 PM • paper 120b • Jim Crawford, Crawford Associates, Paul Kennedy*, Materials Application Development LLC

Role of Carbon in a PEM Fuel Cell System • 3:05 PM • paper 120c • V. K. Mathur*, University of New Hampshire, Dept. of Chemical Engineering, Jim Crawford, Crawford Associates, Xiaofeng Xie, Institute of Nuclear and New Energy Technology

The Role of Thermodynamics and Rate Processes with Respect to Alternative Fuels • 3:35 PM • paper 120d • Michael Neuman, Texas A & M University, Stuart W. Churchill, University of Pennsylvania

Hydrogen Production by Dissociation of Water Through a Novel Membrane • 4:05 PM • paper 120e • Jack A. Shindle, Reinder J. Boersma*, CellTech Power

[121] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Marietta

Microchannel Transport Phenomena: Fundamentals and Applications

Masahiro Kawaji, *Chair*
University of Toronto,
Dept. of Chemical Engr. & Applicated Chemistry
Mohamed S. El-Genk, *Vice-Chair*
University of New Mexico

Sponsored by **Energy Efficiency for a Sustainable Economy**

On a Explicit Relation for Plasma Layer Thickness • 8:30 AM • paper 121a • Kal Renganathan Sharma*, Anna University Affiliated, Ramapuram (opp. MGR Gardens)

The Influence of Bend Geometry on the Performance of a MicroGC • 9:00 AM • paper 121b • Adarsh D. Radadia*, University of Illinois-Urbana

The Effects of Inlet Geometry on Gas-Liquid Two-Phase Flow in Microchannels • 9:30 AM • paper 121c • Masahiro Kawaji*, University of Toronto, Dept. of Chemical Engr. & Applicated Chemistry, Koji Mori, Osak Electro-Communications University

Fabrication and Performance of Pulsating Micro Heat Pipes • 10:00 AM • paper 121d • Kathryn Nikkanen, Christian G. Lu, Masahiro Kawaji*, University of Toronto, Dept. of Chemical Engr. & Applicated Chemistry

Numerical Study on the Gas and Liquid Slugs for Taylor Flow in a Microchannel • 10:30 AM • paper 121e • Dongying Qian*, Adeniyi Lawal, NJCMCS, Stevens Institute of Technology

[122] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, University

Renewable Sources of Energy II

Shashi Lalvani, *Chair*
Miami University,
Paper Science and Engineering
V. K. Mathur, *Vice-Chair*
University of New Hampshire,
Dept. of Chemical Engineering

Sponsored by **Energy Efficiency for a Sustainable Economy**

Conversion Optimization for Geothermal Power Plants • 8:35 AM • paper 122a • Gerald R. Nix*, National Renewable Energy Laboratory

Pyrolysis of Alfalfa Stems and Dedicated Herbaceous Energy Crops in the National Biomass Initiative Program • 9:05 AM • paper 122b • Akwasi A. Boateng*, USDA, Eastern Regional Research Center

Concentrated Acid Pretreatment for the Conversion of Lignocellulosic Materials to Sugar • 9:35 AM • paper 122c • William S. Miller*, Roger D. Hester, The University of Southern Mississippi

Feedstock Flexible Fluidizable Reforming Catalyst Development • 10:05 AM • paper 122d • Esteban Chornet, Yves Parent, Kimberly A. Magrini*, Stefan Czernik, Richard French, NREL

Solar-thermal Decarbonization of Natural Gas — A Near Term Process • 10:35 AM • paper 122e • Alan Weimer*, University of Colorado Dept. of Chemical and Biological Engineering, Allan Lewandowski, National Renewable Energy Laboratory, Raymond Hobbs, Arizona Public Service Corp.

[123] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, University

Energy Tools and Methodologies for Industrial Applications

Frank Zhu, *Chair*
UOP LLC
Kirtan K. Trivedi, *Vice-Chair*
Exxon Mobil Chemical Co.

Sponsored by **Energy Efficiency for a Sustainable Economy**

New Opportunities for Thermal Energy Saving in BPA Chemical Plants Using Real-Time Energy Integration • 2:00 PM • paper 123a • Abd ElRazak El-Saleh, Saudi Aramco, Mahmoud Bahy M. Noureldin*, Kamrul Hasan, University of Waikato

Energy Optimization Tools for Non-Core Business Applications • 2:25 PM • paper 123b • Glenn Hahn, Spirax Sarco, Inc., Frederick P. Fendt*, Rohm and Haas Co., Anthony L. Wright, Oak Ridge National Laboratory

Innovative Absorber/Stripper Configurations for CO_2 Capture by Aqueous Monoethanolamine • 2:50 PM • paper 123c • Majeed S. Jassim*, University of Bahrain, Gary T. Rochelle, University of Texas at Austin

Automated Design and Optimisation of Flexible Utility Systems Under Variable Operating Conditions • 3:15 PM • paper 123d • Oscar Aguilar*, Robin Smith, The University of Manchester

Systematic Driver and Power Plant Selection for Power-Demanding Industrial Processes • 3:40 PM • paper 123e • Frank L. Del Nogal*, Jin-Kuk Kim, Simon J. Perry, Robin Smith, The University of Manchester

Model Centric Approach for Energy Management and Optimization • 4:05 PM • paper 123f • Piyush Shah*, Nii Asante, Jose Desouza, AspenTech

Future Trends and Practical Solutions for Industrial Energy Optimization • 4:30 PM • paper 123g • Frank Zhu*, UOP LLC

[124] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, University

Energy Efficiency for Natural Gas Utilization

Lin Li, *Chair*
UOP LLC
Peter R. Pujado, *Vice-Chair*
UOP LLC

Sponsored by **Energy Efficiency for a Sustainable Economy**

BP/DPT's Efficient Gas Conversion Route • 8:35 AM • paper 124a • Joep J. H. M. Font Freide*, BP Exploration, Tim Gamlin, Davy Process Technology

Having Faced Many Challenges, GTL Technology is Rising into Commercialisation with Significant Advantages for the World and Global Energy Market • 9:10 AM • paper 124b • Theo Pretorius*, SASOL

Advanced Energy Integration in Reforming Technology or Taking the Power Station Out of Steam Reforming • 9:45 AM • paper 124c • John Swinney*, Davy Process Technology Ltd.

Large Scale Production of Synthesis Gas for Methanol and GTL Plants • 10:20 AM • paper 124d • Martin R. Ostberg, Per K. Bakkerud, Kim Aasberg-Petersen*, Haldor Topsoe A/S

Steam Cracking and Natural Gas to Olefins: Energy Efficiency and CO_2 Emissions • 10:55 AM • paper 124e • Tao Ren*, Utrecht University

[125] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, University

Improvements in Energy Efficiency in Process Plants

Paul Tripathi, *Chair*
Shell Energy Efficiency-US
Phil Lewellen, *Vice-Chair*
Shell Global Solutions (US) Inc.

Sponsored by **Energy Efficiency for a Sustainable Economy**

Simplified Heat Transfer Equations for Rotary Kilns • 2:00 PM • paper 125a • Louis E. Herrington*, LEHCO

Effective Plant-Wide Energy Management and Optimization • 2:25 PM • paper 125b • Annelize Victor*, Aspen Technology, Inc.

Techno-Economic Evaluation of an Improved and Energy Efficient Natural Gas Liquid (NGL) Removal Process • 2:50 PM • paper 125c • Dennis Leppin, Aqil Jamal*, Howard Meyer, Gas Technology Institute, Yingzhong Lu, Green Hi-Tek, Javad Abbasian, Illinois Institute of Technology

Save Energy Without Capital Expenditure First Before Investing • 3:15 PM • paper 125d • Paul Tripathi*, Shell Enegy Efficiency-US

Improved Energy Efficiency Using Regenerative Oxidizers for VOC Control • 3:40 PM • paper 125e • Michael J. Hager*, Megtec Systems

Energy Saving Opportunities in Heat-integrated Crude Oil Distillation Systems • 4:05 PM • paper 125f • Vikas Rastogi*, Megan Jobson, Robin Smith, The University of Manchester

Please note: An asterisk (*) indicates the speaker.

Development of Advanced Membranes Technology Platform for Hydrocarbon Separations • 4:30 PM • paper 125g • Dilip Kalthod*, Air Products Prism Membranes

[128] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Montreal/Vancouver/Manila/Singapore

Plenary Talk — Mixing of Miscible Fluids in Microstructured Mixers

Yong Wang, *Chair*
Wang

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Mixing of Miscible Fluids in Microstructured Mixers • 8:00 AM • paper 128a • Volker Hessel*, Patrick Loeb, Holger Loewe, Friedhelm Schoenfeld, IMM Institute of Microtechnology Mainz GmbH

Microreaction for Pharmaceutical Manufacturing • 8:45 AM • paper 128b • Ronald S. Besser*, Adeniyi Lawal, Sunitha Tadepalli, Woo Lee, Raghunath Halder, NJCMCS, Stevens Institute of Technology, S. Kiang, Donald Kientzler, Bristol-Myers Squibb Co.

A CFD Model for Characterising Axial Mixing in Microreactors Operating Under Taylor Flow • 9:40 AM • paper 128c • Asterios Gavriilidis, Panagiota Angeli*, Wael Salman, Dept. Chemical Engineering, University College London

Effective Mixing by the Use of Convective Micro Mixers • 10:00 AM • paper 128d • Michael Engler*, Thomas Kiefer, Norbert Kockmann, Peter Woias, University of Freiburg, IMTEK

Development of a New Micromixer for Rapid Mixing Utilizing Kinetic Energy and Diffusion • 10:20 AM • paper 128e • Hideharu Nagasawa*, Fuji Photo Film Co., Ltd., Nobuaki Aoki, Taisuke Maki, Kazuhiro Mae, Kyoto University

Theoretical and Numerical Investigation of Mixing Processes in a T-shaped Micro-Mixer • 10:40 AM • paper 128f • Carsten Stemich*, H. J. Warnecke, Dieter Bothe, Dept. of Chemistry, Chemical Engineering University of Paderborn

[129] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Regency VII

Unit Operations

Asterios Gavriilidis, *Chair*
University College of London

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Separation Principles in Micro Process Engineering • 2:00 PM • paper 129a • Peter Woias, IMTEK, Freiburg, Germany , Norbert Kockmann*, University of Freiburg, IMTEK

Formulation of Monodisperse Double Emulsions in Microfluidic Devices • 2:20 PM • paper 129b • Toshiro Higuchi, Toru Torii, Shingo Okushima, The University of Tokyo, Takasi Nisisako*, Department of Precision Engineering, Graduate School of Engineering, The University of Tokyo

A Novel Production Microstructured Mixer - Characterization of Mixing Efficiency • 2:40 PM • paper 129c • Patrick Loeb*, Volker Hessel, C. Hofmann, Holger Loewe, Yong Men, Bernd Werner, IMM Institute for Microtechnology Mainz GmbH

Mixing In Structured Microchemical Devices • 3:00 PM • paper 129d • Soumitra Deshmukh*, Dionisios Vlachos, University of Delaware

Microchannel Absorption for Portable Heat Pumps • 3:30 PM • paper 129e • Ward E TeGrotenhuis, Susie Stenkamp*, Battelle PNNL

A Centrifuge-Based Microreactor • 3:50 PM • paper 129f • Stefan Haeberle*, Hans-Peter Schlosser, Roland Zengerle, Jens Ducrée, IMTEK, University of Freiburg

Experimental Benchmark of a Metallic Micro-Separator/Classifier Compared with Representative Hydrocyclone • 4:10 PM • paper 129g • Shinichi Ookawara, Nobuo Oozeki*, Kohei Ogawa, Tokyo Institute of Technology

Pinched Flow Fractionation: A New Method for Continuous Particle Classification Using Microfabricated Structures • 4:30 PM • paper 129h • Minoru Seki*, Osaka Prefecture University, Dept. of Chem. Eng.

[130] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Centennial III

Characterization and Simulation of Microstructured Devices

Michael Matlosz, *Chair*
ENSIC-Nancy

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Hydrogen Production from Ammonia Decomposition: Hierarchical, Multiscale Microkinetic Modeling and Microreactor Simulation •
8:30 AM • paper 130a • Ashish Mhadeshwar, Dionisios Vlachos*, Soumitra Deshmukh, University of Delaware

Effects of Heat Transfer and Flame Stretch in Microcombustors • 8:50 AM • paper 130b • Rich Masel, Craig M. Miesse*, Shaurya Prakash, University of Illinois at Urbana-Champaign

Quantitative Prediction of Separation Efficiency of a Micro-Separator/Classifier by Euler-Granular Model • 9:10 AM • paper 130c • Shinichi Ookawara*, Kohei Ogawa, Tokyo Institute of Technology, David Street, Fluent Asia Pacific

Experimental Investigation of Micromixing in T-Shaped Micromixers Using μ-LIF and μ-PIV • 9:30 AM • paper 130d • Marko Hoffmann*, Michael Schlüter, Norbert Räbiger, University of Bremen, Institute of Environmental Process Engineering (IUV)

Compact Model for a Modular Split-and-Recombine Micromixer • 9:50 AM • paper 130e • Roland Zengerle, Mark Santer, Claudio Cupelli*, Institute of Microsystem Technology (IMTEK) University of Freiburg

High-Speed Videography of Microchannel Array Evaporators • 10:10 AM • paper 130f • Torsten Henning*, Juergen J. Brandner, Klaus Schubert, Forschungszentrum Karlsruhe, Institute for Micro Process Engineering IMVT

DNS Based Evaluation of Residence Time Distribution for Bubble Train Flow in a Square Mini-Channel • 10:30 AM • paper 130g • Alexandru Onea, Braduts Ghidersa, Martin Woerner*, Forschungszentrum Karlsruhe

Compact, Efficient Microreactors for Steam Reforming of Methanol • 10:50 AM • paper 130h • Travis Conant, Jaime Bravo, Abhaya Datye, Ayman Karim*, University of New Mexico

Modeling a Structured Reactor Based on a Plate Heat Exchanger Design • 11:19 AM • paper 130i • Jean Pierre Leclerc*, GP2E-LSGC-CNRS-ENSIC, Mahvand Vafaei, GPM-LSGC-Nancy-CNRS-ENSIC

[131] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Centennial III

Microstructured Reactor Plant Concepts

Juergen J. Brandner, *Chair*
Forschungszentrum Karlsruhe, Institute for Micro Process Engineering IMVT

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

A Catalytic Micro-Structured Reactor Assembly for Generating Hydrogen from Complex Hydrocarbons • 2:05 PM • paper 131a • Jeffrey Harrison, Patricia Irving, Jeff S. Pickles*, Innovatek

Assessment of the Ecological Potential of Microreaction Technology • 2:25 PM • paper 131b • Dana Kralisch*, Günter Kreisel, Institute for Technical Chemistry and Environmental Chemistry, Wolfgang Stirner, Synthacon

Concept of Microreaction Plants for Aggressive Chemicals • 2:45 PM • paper 131c • Thomas R. Dietrich*, Andreas Freitag, Ralf Scholz, Mikroglas Chemtech GmbH

Numbering-Up of Microreactors for Radical Polymerization • 3:05 PM • paper 131d • Takeshi Iwasaki*, The Research Association of Micro Chemical Process Technology, Jun-ichi Yoshida, Kyoto Universit

Flexible Plant Concepts in Microchemical Engineering • 3:25 PM • paper 131e • Dirk Kirschneck*, Microinnova KEG, Maria Kober, Walter Linhart, Microinnova Dr. Kirschneck KEG, Rolf Marr, Graz University of Technology, Institut für Thermische Verfahrenstechnik und Umwelttechnik

DEMiS®: Results from the Development and Operation of a Pilot-Scale Micro Reactor on the Basis of Laboratory Measurements •
3:45 PM • paper 131f • Steffen Schirrmeister*, Karl Josef Caspary, Uhde GmbH, Ferdi Schüth, Thomas Kruppa, Max-Planck-Institut für Kohlenforschung, Enrico Dietzsch, Thomas Schwarz, Elias J. Klemm, Helke Döring, TU Chemnitz, Dept. of Chemical Technology, Rüdiger Schütte, Georg Markowz, Johannes Albrecht, Frank Becker, Degussa AG

[132] Tuesday, April 12, 4:30 PM Hyatt Regency Atlanta, Grand Hall

IMRET 8 Poster Papers

David L. Brenchley, *Chair*
Pacific Northwest National Laboratory

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Design of Fluid Segments in Microreactors: Influences of Design Factors on Mixing by Diffusion and Product Compositions • 4:30 PM • paper 132a • Nobuaki Aoki*, Shinji Hasebe, Kazuhiro Mae, Kyoto University

Application of a Microplant for the Sulfonation of Toluene with Gaseous Sulfur Triox-

ide • 8:50 PM • paper 132aa • Klaus Jaehnisch*, Institute for Applied Chemistry Berlin-Adlershof e.V.

Development of the Integrated Hydrogen Production System Using Micro-Structured Devices • 9:00 PM • paper 132ab • Y. C. Byun, Jaehoon Choe, Youngwoon Kwon*, LG Chem/Research Park, Kwang Ho Song, Korea University

Potential of Microreactor in Production of Phthalic Anhydride from *o*-Xylene • 9:10 PM • paper 132ac • Guhan Mathivanan, Elias J. Klemm*, TU Chemnitz, Dept. of Chemical Technology

Design and Development of a Low-Cost, High-Temperature Silicon Carbide Micro-Channel Recuperator • 4:40 PM • paper 132b • Merrill A. Wilson*, Ceramatec Inc.

Control of Oxidation of Aromatics with Hydrogen Peroxide Under Severe Conditions Using Microreactor System • 4:50 PM • paper 132c • Kunio Yube*, The Research Association of Micro Chemical Process Technology, Kazuhiro Mae, Kyoto University

Synthesis of Terminally Modified Polymer with a Micromixer • 5:00 PM • paper 132d • Toshiharu Kuboyama*, MCPT Kyoto, Jun-ichi Yoshida, Kyoto University

Design of Functionality of Three-Dimensionally Bent Channels Based on Deformation and Rotation of Fluid Interface • 5:10 PM • paper 132e • Ohkawa Kazuo*, Fujisawa Pharmaceutical Co., Ltd.

Halogen-Lithium Exchange Reactions of Aryl- and Heteroaryl Bromides in Microreactor Systems • 5:20 PM • paper 132f • Shigeki Hikage*, MCPT Kyoto, Jun-ichi Yoshida, Kyoto University

Production of Bicolored Polymeric Microspheres Using Sheath Flow Regimes in Microfluidic Devices • 5:30 PM • paper 132g • Toru Torii, Toshiro Higuchi, The University of Tokyo, Yoichi Takizawa, Takanori Takahashi, Soken Chemical & Engineering, Co. Ltd., Takasi Nisisako*, Dept. of Precision Engineering, Graduate School of Engineering, The University of Tokyo

Micromotive -Development and Fabrication of Miniaturised Components for *e.g.* Gas Generation in Fuel Cell Systems • 5:40 PM • paper 132h • Peter Pfeifer*, Forschungszentrum Karlsruhe

Rapid and Continuous Separation of Satellite Droplets Using A Branching Microchannel Configuration • 5:50 PM • paper 132i • Takasi Nisisako*, Dept. of Precision Engineering, Graduate School of Engineering, The University of Tokyo, Toru Torii, Toshiro Higuchi, The University of Tokyo

Fabrication of a PCBMEMS Electrochemical Sensor for Detecting Explosive Residues in the Field • 6:00 PM • paper 132j • Xiaojuan (Judy) Fu*, Center for Ocean Technology, University of South Florida

Highly Selective Methanation in Microreactors • 6:10 PM • paper 132k • Oliver Gorke*, Forschungszentrum Karlsruhe

Fast Temperature Cycling of Catalytic Reactions Using Microreactors • 6:20 PM • paper 132l • Martin Luther*, Institute for Micro Process Engineering, Karlsruhe Research Center

A Fundamental Three-Phase Reactor Characterization Study in a Thin-Film Catalyzed Multifunctional Structure • 6:30 PM • paper 132m • Xun Ouyang*, Daniel Schweich, Isabelle Pitault, CNRS/CPE Lyon, Valérie Meille, LGPC

Preparation of Mono-Dispersed Mixed Metal Oxide Micro Hollow Spheres by Homogeneous Precipitation in a Micro Fluidic Reactor • 6:40 PM • paper 132n • Yong-Ki Park*, Jae Han Kim, Won Choon Choi, Hee Young Kim, KRICT, Yong Kang, Chungnam National University

Measurement of Three-Dimensional Distributions Inside Microchannels • 6:50 PM • paper 132o • Toru Hinouchi*, Makoto Kawano, Mitsue Sato, Hiroshi Koyama, Katsumi Isozaki, Yokogawa Electric Corp.

The Use of Input-Response Measurements as a Basis for Modeling the Residence Time Distribution of Microreactors • 7:00 PM • paper 132p • Dusan Boskovic*, Klaus Huber, Stefan Loebbecke, Fraunhofer Institute for Chemical Technology

PrOx in a Microreactor: Modeling of Reaction Kinetics and Effect of Heat Transfer Limitations • 7:10 PM • paper 132q • Xun Ouyang*, CNRS/CPE Lyon, Pauline Ho, Reaction Design, Inc., Ronald S Besser, NJCMCS, Stevens Institute of Technology

Experimental and Numerical Evaluation of Micro Heat Exchanger Using Catalytic Combustion • 7:20 PM • paper 132r • In-Soo Ryu, Hee-Yeon Kim, Kwang-Sup Song, Sang-Phil Yu, Seung-Jae Lee*, Nam-Jo Jeong, Korea Institute of Energy Research

Multi-Layered Composite Nanocrystals Prepared in a Micro-Fluidic Reactor • 7:30 PM • paper 132s • Masato Uehara*, National Institute of Advanced Industrial Science and Technology (AIST)

Gaseous Flows in Microchannels • 7:40 PM • paper 132t • Shinsuke Mori, Aguru Yamamoto*, Masaaki Suzuki, The Research Association of Micro Chemical Process Technology at Dept. of Chemical Engineering, Tokyo Institute of Technology

Optimal Design Approach for Microreactors with Desired Temperature, Concentration and Residence Time Distributions • 7:50 PM • paper 132u • Osamu Tonomura*, Manabu Kano, Shinji Hasebe, Kyoto University, Masaru Noda, NAIST

Influence of Solubility/Mixing Effects on Chemical Reactions in Microfluidic Systems • 8:00 PM • paper 132v • Takeshi Honda*, Masaya Miyazaki, Kenichi Yamashita, Yoshiko Yamaguchi, Hiroyuki Nakamura, Hideaki Maeda, AIST

Partial Chemical Modification of a Microchannel and Stabilization of Water-oil Phase Separation • 8:10 PM • paper 132w • Yoshiko Yamaguchi*, Takeshi Honda, Kenichi Yamashita, Masaya Miyazaki, Hiroyuki Nakamura, Hideaki Maeda, AIST, Kazuya Ogino, Fuminori Takagi, Graduate School of Science and Engineering, Saga University

A Comparison of Passive Mixing Microchannels • 8:20 PM • paper 132x • Kristin J. Hecht*, Jeremy J. Goeckeritz, J. A. Bishop, University of Utah

Continuous Polymerization of PTFE in a Microreactor System • 8:30 PM • paper 132y • Kazuhiko Yamada, Shin Tatematsu, Nobuyuki Kasahara, Katsuya Ueno*, Asahi Glass Co.,Ltd.

Layer-by-Layer Self-Assembly of Nano- and Micro-Particles as a Catalyst Integration Method for Microreactor Applications • 8:40 PM • paper 132z • Woo Lee, Hongwei Qiu*, NJCMCS, Stevens Institute of Technology

[133] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Centennial III

Modularization and Multiscale Design

Claude de Bellefon, *Chair*
CNRS Lyon
Shinji Hasebe, *Vice-Chair*
Kyoto University

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Application of Controlled Thermal Expansion in Microlamination for the Economical Production of Bulk Microchannel Systems • 8:40 AM • paper 133a • Christoph Pluess, Brian Paul*, Oregon State University

Commercial Scale Microchannel Technology Methodology and Capabilities • 9:00 AM • paper 133b • Ravi Arora, Anna Lee Tonkovich*, Sean Fitzgerald, Velocys, Inc.

Modular Lab Tool for Microreaction Processes: The FAMOS System • 9:20 AM • paper 133c • Stefan Loebbecke*, Slobodan Panic, Tobias Tuercke, Juergen Antes, Dusan Boskovic, Fraunhofer Institute Chemical Technology

Evaporation of Hydrogen Peroxide in a Microstructured Falling Film • 9:40 AM • paper 133d • Steffen Schirrmeister, Uhde GmbH, Guhan Mathivanan, Elias J Klemm*, Dept. of Chemical Technology, TU Chemnitz, Johannes Albrecht, Georg Markowz, Degussa AG,

Gas-Liquid Mass Transfer in a Microstructured Falling Film Reactor • 10:00 AM • paper 133e • Stéphane A. Claudel*, Institut Francais du Petrole

Selective Condensation Reaction of Phenols and Formaldehyde Using a Micromixer • 10:20 AM • paper 133f • Noboru Daito*, The Research Association of Micro Chemical Process Technology, Jun-ichi Yoshida, Kazuhiro Mae, Kyoto University

Continuous Hydrogenation Reactions in a Novel Gas-Liquid Flow Reactor Packed with Pd/C • 10:40 AM • paper 133g • Nungruethai Yoswathananont*, Nitta Kohei, Yumi Nishiuchi, Masaaki Sato, Osaka Prefecture University

[134] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Centennial III

Microstructured Devices as Tools in Chemical Research

Thomas Schwalbe, *Chair*
CPC Mainz
Masaaki Sato, *Vice-Chair*
Osaka Prefecture University

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Applications of Microreactor in Pharmaceutical Development & Production • 2:00 PM • paper 134a • Yeung Chan*, Bristol-Myers Squibb

A New Concept for the Measurement of Strong Exothermicities in Microreactors • 2:20 PM • paper 134b • Juergen Antes*, Daniel Schifferdecker, Stefan Loebbecke, Fraunhofer Institute for Chemical Technology

Please note: An asterisk (*) indicates the speaker.

An Integrated Stacked Micro Fluidic Reactor System for Nanoparticle Synthesis • 2:40 PM • paper 134c • Paryog Datta, Josef Hormes, Yujun Song, Jost Goettert, Challa Kumar*, Center for Advanced Microstructures and Devices, Willi Hempelmann, 2MicroMechatronicTechnologies AG

Catalytic Investigations in Microchannels at Reduced Pressure • 3:00 PM • paper 134d • Andreas Kolbl*, Forscdhungszentrum Karlsruhe GmbH IMVT

Rapid Optimization of Glycosylations in Microreactors • 3:20 PM • paper 134e • Edward R. Murphy*, Daniel M. Ratner, MIT

Comparisons Between a Thin-Film Catalyzed Microreactor and Conventional Lab Reactors for PrOx Kinetic Studies • 3:40 PM • paper 134f • Xun Ouyang*, CNRS/CPE Lyon, Lucie Bednarova, Haibiao Chen, Adeniyi Lawal, Woo Lee, Ronald S Besser, NJCMCS, Stevens Institute of Technology, Pauline Ho, Reaction Design, Inc., Stanley Pau, Lucent Technologies/Bell Labs

Polymerization in Microfluidic Devices: Numerical Simulations and Experimental Investigations • 4:00 PM • paper 134g • Christophe A. Serra*, Louis Pasteur Unversity, Nicolas Sary, LIPHT-ECPM / ULP-CNRS

Reaction Rate Enhancement of Catalytic CO Oxidation Under Forced Thermal Oscillations in Microreactors with Real-Time Gas Detection • 4:20 PM • paper 134h • Soren Jensen*, Jakob L. Olsen, Heine Hansen, Ole Hansen, Ulrich J. Quaade, Dept. of Micro- and Nanotechnology, Technical University of Denmark,

Brominations in Micro Reactors Using High and Low p,T-Processing • 4:40 PM • paper 134i • Patrick Loeb*, H. Klefenz, Volker Hessel, Holger Loewe, C. Hofmann, K. Mazanek, IMM Institute for Microtechnology Mainz GmbH

[135] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, Centennial III

Single Reactors I

Albert Renken, *Chair*
Ecole Polytechnique Fédérale de Lausanne (EPFL)
Jun-ichi Yoshida, *Vice-Chair*
Kyoto University

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Novel Glass Micro-Reactor for Water Gas Shift Reaction Characterization • 8:34 AM • paper 135a • Samrat Mukherjee*, Miltiadis K. Hatalis, Mayuresh V. Kothare, Lehigh University

Microprocess Technology for Fischer-Tropsch Gas-To-Liquids • 8:54 AM • paper 135b • Yong Wang*, Wang, John Hu, James Cao, PNNL, Terry Mazanec, Velocys, Inc.

Microreactor for Endothermic Heterogeneous Catalysis Reaction • 9:14 AM • paper 135c • Marilyne Roumanie*, Christophe Pijolat, EMSE/SPIN/MICC, Cyril Delattre, Patrick Pouteau, CEA/LETI, Valérie Meille, LGPC, Claude de Bellefon, CNRS Lyon

Multichannel Microstructured Reactor for Hydrogen Production • 9:34 AM • paper 135d • Chrystèle Horny*, Lioubov Kiwi-Minsker, Albert Renken, Ecole Polytechnique Fédérale de Lausanne (EPFL)

Novel Microreactor Design for Balancing Heat and Mass Transfer • 10:10 AM • paper 135e • Ward E. TeGrotenhuis*, Battelle-PNNL, Kriston P. Brooks, Robert A. Dagle, James M. Davis, Jamelyn D. Holladay, David L. King, Benjamin Q. Roberts, Pacific Northwest National Laboratory

The Effects of Microreactor Geometry on the Performance of Anodized Alumina Microreactors • 10:30 AM • paper 135f • Rich Masel, Ed Seebauer, Zheng Ni*, Univ of Illinois at Urbana Champaign

Catalyst Stabilization for Cyclohexene Hydrogenation • 10:50 AM • paper 135g • Jung Woon Lee, Kay Kin Yeong, Asterios Gavriilidis*, University College of London, Ralf Zapf, Volker Hessel, IMM Institute for Microtechnology Mainz GmbH

Decomposition of Carbon Dioxide in a Micro Plasma Reactor • 11:10 AM • paper 135h • Shinsuke Mori*, Aguru Yamamoto, Masaaki Suzuki, The Research Association of Micro Chemical Process Technology at Dept. of Chemical Engineering, Tokyo Institute of Technology

[136] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, Piedmont

Energy Generation Systems

Holger Loewe, *Chair*
IMM Institute for Microtechnology Mainz GmbH
Takehiko Kitamori, *Vice-Chair*
The University of Tokyo, School of Engineering

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Fuel to Hydrogen — An Overview Over Fuel Conversion Activities at the Institute for Micro Process Engineering • 8:30 AM • paper 136a • Peter Pfeifer*, Forschungszentrum Karlsruhe

Design Principles Of Multifunctional Microdevices • 8:50 AM • paper 136b • Dionisios Vlachos, Soumitra Deshmukh*, University of Delaware

Transport Phenomena Applicable to Microchemical Systems • 9:10 AM • paper 136c • Khaled A Alfadhel*, Kuwait University, Mayuresh V. Kothare, Lehigh University

Fabrication and Characterization of Integrated Ceramic Microreactors for High-Temperature Hydrogen Production • 9:30 AM • paper 136d • Paul Kenis*, Nfn Christian, Michael Mitchell, UIUC, Dong-Pyo Kim, Inkyung Sung, Chungnam National University

Temperature Profiles and Residence Time Effects in Metallic Microchanneled Reactor for Hydrogen Production • 9:50 AM • paper 136e • Ingrid Aartun*, Bozena Silberova, Hilde J. Venvik, Anders Holmen, Norwegian University of Science and Technology, Peter Pfeifer, Oliver Gorke, Klaus Schubert, Forschungszentrum Karlsruhe, Institute for Micro Process Engineering IMVT

Microreactors for The Production Of Hydrogen From Ammonia • 10:10 AM • paper 136f • Jason Ganley, Howard University, Ed Seebauer, Rich Masel*, UIUC

Engineered Catalyst for Steam Reforming of Methane and Diesel Fuel in a Microchannel Reformer • 10:30 AM • paper 136g • Ying Peng*, Quentin Ming, Jeffrey Harrison, Patricia Irving, InnovaTek

Micro Reaction Technology for Energy Conversion • 10:50 AM • paper 136h • Brandon S. Blackwell*, Benjamin Wilhite, Leonel Arana, Ole Nielsen, Kerry Cheung, Massachusetts Institute of Technology, Martin A. Schmidt, Microsystems Technology Laboratories, Massachusetts Institute of Technology, Klavs F. Jensen, Dept. of Chemical Engineering, Massachusetts Institute of Technology

[137] Thursday, April 14, 2:00 PM Hyatt Regency Atlanta, Piedmont

Nanostructures and Nanoparticles

Steve J. Haswell, *Chair*
University of Hull

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Spatially Resolved PhotolumInescence Analysis of Aqueous CdS Nanoparticle Synthesis in a Microreactor • 2:05 PM • paper 137a • Thomas L. Sounart*, Terry A. Michalske, Carolyn M. Matzke, James A. Voigt, David R. Tallant, Jeffrey J. Hoyt, Sandia National Laboratories

Micro Fluidic Synthesis of Metallic Nanoparticles • 2:25 PM • paper 137b • Challa Kumar, Yujun Song*, Josef Hormes, Center for Advanced Microstructures and Devices

Novel Synthesis of Fullerene Nanowhiskers in a Microchannel Reactor • 2:45 PM • paper 137c • Sung-Ho Lee*, Sohei Matsumoto, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology, Kun'ichi Miyazawa, National Institute for Materials Science

High Surface Area Mixed Oxide Supports for High Temperature Catalysis in Micro-Reactors • 3:05 PM • paper 137d • Rich Masel, Zheng Ni, Vaidyanathan Subramanian*, Univ of Illinois at Urbana Champaign

Design and Fabrication of Infiltratable Multiscale Catalytic Cellular Structures into Microchannel • 3:25 PM • paper 137e • Haibiao Chen*, Woo Lee, NJCMCS, Stevens Institute of Technology

Evaluation of Mixing Efficiency of Microdevices by Preparation of Polymer Nano-Particles • 4:00 PM • paper 137f • Taisuke Maki*, Yoshikage Omukai, Kazuhiro Mae, Dept. of Chem. Eng., Kyoto University, Hideharu Nagasawa, Fuji Photo Film Co., Ltd.

A Microfabricated Segmented-Flow Reactor for the Synthesis of CdSe Quantum Dots • 4:20 PM • paper 137g • Brian K. H. Yen*, Moungi G. Bawendi, Dept. of Chemistry, Massachusetts Institute of Technology, Axel Guenther, Klavs F. Jensen, Dept. of Chemical Engineering, Massachusetts Institute of Technology, Martin A. Schmidt, Microsystems Technology Laboratories, Massachusetts Institute of Technology

Progress Towards High-Throughput Dendrimer Synthesis • 4:40 PM • paper 137h • Brian Paul*, Oregon State University

[138] Thursday, April 14, 2:00 PM Hyatt Regency Atlanta, Centennial III

Single Reactors II

Albert Renken, *Chair*
Ecole Polytechnique Fédérale de Lausanne (EPFL)
Jun-ichi Yoshida, *Vice-Chair*
Kyoto University

Sponsored by **IMRET 8 — 8th International Conference on Microreaction Technology**

Solids Technology Using Microstructured Devices • 2:04 PM • paper 138a • Maria Kober*, Walter Linhart, Microinnova Dr. Kirschneck KEG, Dirk Kirschneck, Microinnova KEG, Rolf Marr, Graz University of Technology, Institut für Thermische Verfahrenstechnik und Umwelttechnik

Living Cationic Polymerization Based on "Cation Pool" Method Using Microsystem • 2:24 PM • paper 138b • Mitsuo Sawamoto, Jun-ichi Yoshida*, Aiichiro Nagaki, Kohsuke Kawamura, Seiji Suga, Tsuyoshi Ando, Kyoto University

Swern Oxidation Reactions Using a Microreactor • 2:44 PM • paper 138c • Tatsuya Kawaguchi*, Micro Chemical Process Technology Research Association, Hiroyuki Miyata, Kikuo Ataka, Ube Industries, Ltd. , Kazuhiro Mae, Jun-ichi Yoshida, Kyoto University

Kinetic Investigations on Selective Acetylation of Nucleophilic Groups of Cysteine in a Micromixer-Microchannel Reactor Module • 3:04 PM • paper 138d • Peter Pfeifer*, Forschungszentrum Karlsruhe

Engineering of Depletion Boundary Layers in Electrochemical Microreactors; Application to Cofactor Regeneration • 3:40 PM • paper 138e • Seong Kee Yoon, Paul Kenis*, UIUC

New Functions for Microfluidic Components by Using Micro Metal Injection Molding (µMIM) • 4:00 PM • paper 138f • Torben Seemann, Natalie Salk, Astrid Rota, Fraunhofer Institute for Manufacturing and Advanced Materials (IFAM), Michael Schlüter, Marko Hoffmann*, Norbert Räbiger, University of Bremen, Institute of Environmental Process Engineering (IUV), Carsten Harms, Bremerhaven Institute of Biological Information Systems (BIBIS)

Advantages of Microsystems Technology in Lead Discovery • 4:20 PM • paper 138g • Maria J. V. Chapela*, GlaxoSmithkline

[140] Monday, April 11, 4:30 PM Hyatt Regency Atlanta, Grand Hall

General Poster Session

The Use of Reverse TRIZ/Psychology to Identify Potential Failure Routes and Mechanisms • paper 140a • Jack Hipple*, Innovation-TRIZ

Investigative Study of the Flash Point for Binary Mixtures of Alkanes, Alcohols, and Other Flammable Substances • paper 140b • George Awuku-Budu, Olurotimi O. Sonaike, Prairie View A&M University, Irvin W. Osborne-Lee*, Osborne-Lee

Comparison of Thermodynamic Models for Prediction of the Flash Point for Ideal and Non-Ideal Binary Flammable Mixtures • paper 140c • Olurotimi O. Sonaike, George Awuku-Budu, Prairie View A&M University, Irvin W. Osborne-Lee*, Osborne-Lee

Human Error Probability Calculation For Offshore Operation • paper 140d • Faisal I. Khan*, Memorial University of Newfoundland, Paul R. Amyotte, Dalhousie University, Dean G. DiMattia

Human Error as a Causal Factor in Chemical Releases in the Manufacturing Industry • paper 140e • Perri Ruckart*, Wendy E. Kaye, Maureen Orr, Agency for Toxic Substances and Disease Registry (ATSDR)

Using the Adiabatic Flame Temperature to Predict the Flammability of Lower Alkanes, Carboxylic Acid and Acetates • paper 140f • J. Wayne Chastain*, Eastman Chemical Co., Vincent Van Brunt, University of South Carolina

Effects of Impurities on Crystal Growth in Sucrose Crystallization • paper 140g • Lie-Ding Shiau*, Chang Gung University

Proper Care and Handling of Regulators During Inspections • paper 140h • Fen M. Simmons*, Fluor Hanford Inc.

Blended Chitosan and Polyvinyl Alcohol Membranes for the Pervaporation Dehydration of Isopropanol • paper 140i • Peter L. Douglas, Shude Xiao, Pu Chen, Robert Y. M. Huang, Apichit Svang-Ariyaskul*, Rajinder Pal, Xianshe Feng, Dept. of Chemical Engineering, University of Waterloo

Modeling of Three-Phase Reactive Distillation Columns with Chemical Reaction Equilibrium • paper 140j • Rahman Khaledi*, P. Raj Bishnoi, University of Calgary

Etilendiamine Analysis by Near Infrared Method • paper 140k • Jose M. Cruz*, Instituto Mexicano del Petroleo

Recycle Effect on Membrane Extraction through Countercurrently Cross-Flow Flat-Plate Modules • paper 140l • Ho-Ming Yeh*, Tamkang University

The Challenges and Opportunities of the Hydrogen Storage • paper 140m • Ming Au*, Savannah River National Laboratory

Finite Difference Modeling of a Moving Bed Reactor Used in Calcination of Limestone • paper 140n • Navraj S. Hanspal*, Vahid Nassehi, Loughborough University, Kailash Singh, Dept. of Chemical Engineering, Perth, Austrailia, Saurabh D. Garg, Wipro Technologies, Raj Sharma, School of Chemical Engineering, Durban, South Africa

Training for Excursion Response: Using Dynamic Simulation with Noise • paper 140o • Muralidhar Saturuli*, Colin S. Howat, University of Kansas

Impact of New Source Review Rule on Ethylene (and Other Chemical) Manufacturers • paper 140p • Jerry Brouillette*, Shaw Environmental & Infrastructure Inc.

Water Usage Analysis for the Post-Plating Rinsing Process • paper 140q • Ashok V. Naimpally*, Uduak-Joe Ntuk, Akane Yoshimizu, Luis H. Perez, California State University, Long Beach

Energy Auditing of Government Buildings • paper 140r • Robert W. Peters*, University of Alabama at Birmingham, Jeffery P. Perl, Chicago Chem Consultants Corp., Russell Moore, Alabama Dept. of Economic and Community Affairs

Comparison of CNG and 100% Hydrogen Fuels on the Basis of Emissions and Efficiency Performance Using a Ford F-150 • paper 140s • Samrat Dutta, Robert W. Peters*, Fouad H. Fouad, University of Alabama at Birmingham, Henry Ng, Michael J. Duoba, Argonne National Laboratory

Hydrogen-Based Fuel Cell Technology for Combined Heat and Power Generation • paper 140t • Jaimini Upadhyaya, Robert W. Peters*, Fouad H. Fouad, University of Alabama at Birmingham, Rajesh K. Ahluwalia, Ezzat Danial Doss, Argonne National Laboratory

The Application of 3-Dimension Figure Design Technique on Inners of Packs • paper 140u • Yufeng Tian, Liyan Liu, Jinsheng Sun*, Xingang Li, National Engineering Research Center for Distillation Technology, Tianjin, China

Dynamic Reactor Models Embedded into a Steady-State Process Simulator • paper 140v • James E. Smith, Jr.*, Anh Nguyen, University of Alabama in Huntsville, David Hill, Chemstations, Inc.

Soot Formation in an Autothermal Reforming Burner at Elevated Pressures • paper 140w • Steven F. Rice*, Sandia National Laboratories

[141] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, International North

Joint CCPS/LPS/PPSS Plenary Session

Sponsored by
20th Annual CCPS International Conference
Co Sponsored by
TH — Process Plant Safety Symposium
Co Sponsored by **TG —39th Annual Loss Prevention Symposium**

Preventing Incidents at Newly Acquired Facilities — Implementation of Lessons Learned • 8:00 AM • paper 141a • Glen A. Peters, C. Lorn Paxton, Brian Dunbobbin, Air Products & Chemicals Inc., Martin A. Dennehy, Air Products plc.

Organizational Factors that Influence Safety: How NASA and Other Organizations are Changing Their Safety Culture • 8:30 AM • paper 141b • Patrick Killimet*, BST, Inc.

[142] Monday, April 11, 9:00 AM Hyatt Regency Atlanta, International North

CCPS/LPS/PPSS Conference Keynote

Sponsored by
20th Annual CCPS International Conference
Co Sponsored by
TH — Process Plant Safety Symposium
Co Sponsored by **TG — 39th Annual Loss Prevention Symposium**

[143] Monday, April 11, 10:15 AM Hyatt Regency Atlanta, International North

Risk Management

Mike Broadribb, *Chair*
BP Americas
Sponsored by
20th Annual CCPS International Conference

Process Safety Indicators • 10:15 AM • paper 143a • Ian Travers*

Continuously Improving PSM Effectiveness — A Practical Roadmap • 10:45 AM • paper 143b • Steve Arendt*, ABS Consulting

Managing Catastrophic Risk: Quantitative Methods that Provide Insight and Decision Support • 11:15 AM • paper 143c • Scott Schiller, ConocoPhillips, Jatin Shah, BakerRisk

Use of Process Risk Analysis and System Assessments to Drive PSM Improvement • 11:45 AM • paper 143d • John W. Herber*, 3M Co.

[144] Monday, April 11, 1:45 PM
Hyatt Regency Atlanta, International North

Critical Asset Protection

Steve Arendt, *Chair*
ABS Consulting
Sponsored by
20th Annual CCPS International Conference

Risk Analysis Methodology for Critical Asset Protection (RAMCAP) • 1:45 PM • paper 144a • David A. Moore*, AcuTech Consulting Group

Process Control Systems in the Chemical Industry: Safety vs. Security • 2:15 PM • paper 144b • Donna Post Guillen*, Idaho National Engineering and Environmental Laboratory, Control Systems Security Test Center

CDC's Role in Chemical Weapons Elimination Oversight: Use of Hazards and Safety Analysis for Safe Destruction of Chemical Warfare Agents and Weapons • 2:45 PM • paper 144c • Terry Tincher*, Centers for Disease Control and Prevention, Chemical Weapons Elimination Team

[145] Monday, April 11, 4:00 PM
Hyatt Regency Atlanta, International North

Risk Analysis

Don Abrahamson, *Chair*
Occidental Chemical
Sponsored by
20th Annual CCPS International Conference

Integrity of Piping Systems: Nature and Scope of the Problem Viewed from a Regulator's Perspective • 4:00 PM • paper 145a • Michael Skellett*

Development of a Risk Based Inspection Implementation Manual • 4:30 PM • paper 145b • Dave Frurip, The Dow Chemical Co, Thermal Lab/Reactive Chemicals Testing, Emory Ford, Ricardo Valbuena, Michael Renner, John Aller, Gary Mallard, National Institute for Standards and Technology, Chemical Reference Data Group, Eric Clark, SOCMA Government Relations

[146] Tuesday, April 12, 8:00 AM
Hyatt Regency Atlanta, International North

Better Results with Fewer Resources

Tim Overton, *Chair*
Dow Chemical
Sponsored by
20th Annual CCPS International Conference

Beyond Compliance — The Future Role of Risk Tools? • 8:00 AM • paper 146a • Nic Cavanagh, Jeremy Lin, DNV Software Risk Management Solutions

The DOE Emergency Management System and Mitigation of Chemical Accident Risk • 8:30 AM • paper 146b • James T. Powers, Office of Emergency Management, U.S. Dept. of Energy, James D. Jamison, Science Applications International Corp. (SAIC)

CCPS Process Safety Next Generation Project: Better Results with Fewer Resources • 9:00 AM • paper 146c • Jack McCavit, Celanese

[147] Tuesday, April 12, 10:15 AM
Hyatt Regency Atlanta, International North

Panel: Where We Have Been and Where We Are Going

Jack McCavit, *Chair*
Celanese
Sponsored by
20th Annual CCPS International Conference

Bhopal Accident and its Effects on Process Safety Worldwide • 10:15 AM • paper 147a • J. P. Gupta, Indian Institute of Technology, Dept. of Chemical Engineering

200 Years of PSM at DuPont • 10:45 AM • paper 147b • David Cummings, James A. Klein, DuPont, Curtis C. Clements, DuPont Engineering Technology

Nurturing Strong Process Safety Culture • 11:15 AM • paper 147c • Dave Jones, Chevron-Texaco, Shakeel Kadri, APCI

[148] Tuesday, April 12, 2:00 PM
Hyatt Regency Atlanta, International North

Hazard Analysis

Pete Lodal, *Chair*
Eastman Chemical
Sponsored by
20th Annual CCPS International Conference

The Right People — Key to a Successful Hazard Review • 2:00 PM • paper 148a • William Bradshaw, ABSG Consulting Inc., Johnathan Babcock, Eli Lilly and Co.

The Dow Chemical Company's Reactive Chemicals Resource Center (RCRC) • 2:30 PM • paper 148b • Harold Johnstone*, The Dow Chemical Co.

Using the Adiabatic Flame Temperature to Predict the Flammability of Lower Alkanes, Carboxylic Acid and Acetates • 3:00 PM • paper 148c • R. Ervin, Vanderbilt University, R. Kline, J. Wayne Chastain, Pete Lodal, Eastman Chemical Co., M. Palucis, Vincent Van Brunt, T. Glowienka, University of South Carolina

[149] Tuesday, April 12, 4:00 PM
Hyatt Regency Atlanta, International North

Risk Mitigation

Scott Berger, *Chair*
American Institute of Chemical Engineers
Sponsored by
20th Annual CCPS International Conference

Hydrogen Safety Review Panel: Shaping Safety Awareness • 4:00 PM • paper 149a • Steven C. Weiner, Bruce Kinzey, Pacific Northwest National Laboratory, Edward G. Skolnik, Energentics, Inc.

Hazard Potential Analysis for Freeway Transportation of Toxic Substances • 4:30 PM • paper 149b • Jen-zen Chen, Kuo-Shuh Fan, S-Chien Huang, National Kaohsiung First Univ. of Science and Technology, Dept. of Safety, Health and Environmental Eng.

[150] Tuesday, April 12, 5:00 PM
Hyatt Regency Atlanta, International North

Process Safety in Iraq: Challenges and Opportunities

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[151] Wednesday, April 13, 8:00 AM
Hyatt Regency Atlanta, International North

Inherent Safety

Karen Person, *Chair*
American Institute of Chemical Engineers
Sponsored by
20th Annual CCPS International Conference

Achieving Effective Alarm System Performance: Results of ASM Consortium Benchmarking Against EEMUA Publication No. 191 Guidelines • 8:00 AM • paper 151a • Tim Montgomery, ChevronTexaco Energy Technology Co., Dal Vernon C Reising, Honeywell Laboratories

Dynamic Risk Assessment of Inherently Safe Chemical Processes: Accident Precursor Approach • 8:30 AM • paper 151b • Warren D. Seider, Anjana Meel, University of Pennsylvania

Judging Effectiveness of Inherent Safety for Safety and Security of Chemical Facilities • 9:00 AM • paper 151c • David A. Moore*, AcuTech Consulting Group

[152] Wednesday, April 13, 10:15 AM
Hyatt Regency Atlanta, International North

Risk Management

Karen Tancredi, *Chair*
Dupont
Sponsored by
20th Annual CCPS International Conference

The Safety Quality Factor — Tuning LOPA in Risk Analysis • 10:15 AM • paper 152a • J. Gort, TNO Work & Employment, Ronald J. A. Kersten, TNO Prins Maurits Laboratory

FERC Consequence Analysis Model for LNG Spillage onto Water: Effects of Cargo Tank Release Assessment Variables • 10:45 AM • paper 152b • Yuanhua Qiao*, M. Sam Mannan, Mary Kay O'Connor Process Safety Center, Harry H. West, Texas A&M University, David W. Johnson, John B. Cornwell, Quest Consultants Inc.

Facility Siting Analysis — Results Presented Using a Company's Risk Protocol • 11:15 AM • paper 152c • Cheryl A. Grounds*, Baker Engineering and Risk Consultants

Determining the Societal Risks from COMAH Major Accident Hazard Installations • 11:45 AM • paper 152d • Mark Lawton, Stuart Reston, Tom Maddison, Andy Fowler

[153] Wednesday, April 13, 1:45 PM
Hyatt Regency Atlanta, International North

Case Histories

Mike Rogers, *Chair*
Syncrude Canada
Sponsored by
20th Annual CCPS International Conference

Uncertainties in Evaluating Human Response to Toxic Exposure • 1:45 PM • paper 153a • Joseph R. Natale, Baker Engineering & Risk

Consultants, Krishna Mudan, MSA Risk & Economic Consultants

Modeling of a Warehouse Fire — A Case Study • 2:15 PM • paper 153b • R. Michalowicz, E Alp, Alp & Associates Inc.

Tantalum Powder Dust Explosion Analysis • 2:45 PM • paper 153c • C. James Dahn, Ashok G. Dastidar, Safety Consulting Engineers, Inc.

[154] Wednesday, April 13, 4:00 PM
Hyatt Regency Atlanta, International South

Case Histories — Joint Session (CCPS, LPS, and PPSS)

Walt L. Frank, *Chair*
ABS Consulting

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TH — Process Plant Safety Symposium
Co Sponsored by **TG — 39th Annual Loss Prevention Symposium**

The 27 March 2003 Billy-Berclau Accident — A Technical and Organisational Investigation • 4:00 PM • paper 154a • Samantha Lim, Nicholas Dechy*, Emmanuel LePrette, Jean-Christophe LeCoze, INERIS

When Risk Becomes Reality: Formosa Plastics' Response to a Plant Explosion. • 4:30 PM • paper 154b • Robert Thibault, Formosa Plastic

Handling Chemicals in Small Containers • 4:55 PM • paper 154c • Albert I. Ness*, Rohm & Haas

[155] Monday, April 11, 11:15 AM
Hyatt Regency Atlanta, Regency V and VI

Fuels and Petrochemicals Division Keynote Presentation

Sponsored by **Fuels and Petrochemicals Div.**

Fuels and Petrochemicals Division Keynote Presentation • 11:15 AM • paper 155a • Rich Marcogliese*, Valero

[157] Tuesday, April 12, 8:30 AM
Hyatt Regency Atlanta, Piedmont

Nanotechnology Plenary I

Bob Hoch, *Chair*
Hyperion Catalysis International
R. Bertrum Diemer, *Vice-Chair*
DuPont

Sponsored by **Nanotechnology**

Overview of Nanotechnology • 8:30 AM • paper 157a • Speaker to be announced

Trends in Nanoscale Science and Engineering Research and Technology • 9:30 AM • paper 157b • Gil U. Lee*, School of Chemical and Biomedical Engineering, Purdue University

Working with Engineered Nanomaterials: Towards Developing Safe Work Practices • 10:30 AM • paper 157c • Andrew D. Maynard*, National Institute for Occupational Safety and Health

[158] Tuesday, April 12, 2:00 PM
Hyatt Regency Atlanta, Piedmont

Nanotechnology Plenary II

R. Bertrum Diemer, *Chair*
DuPont

Bob Hoch, *Vice-Chair*
Hyperion Catalysis International

Sponsored by **Nanotechnology**

Creating Value Through Nanoscale Science and Engineering: A Large Company Perspective • 2:00 PM • paper 158a • Krishna C. Doraiswamy*, E.I. DuPont and Co.

Nanotechnology in Information Technology • 3:00 PM • paper 158b • Charles Black*, IBM T. J. Watson Research Center

Nanopatterned Epitaxial Graphene: A New Approach to Nanographite Electronics • 4:00 PM • paper 158c • Walt A. De Heer*, Georgia Institute of Technology

[159] Monday, April 11, 8:00 AM
Hyatt Regency Atlanta, Techwood

Thermodynamics and Phase Equilibria I

Charles A. Eckert, *Chair*
Georgia Institute of Technology
Amyn S. Teja, *Vice-Chair*
Georgia Institute of Technology

Sponsored by
Engineering Sciences and Fundamentals

Vapor Pressure Characterization of Biomass Related Compounds Using a Modified Knudsen Effusion Technique • 8:05 AM • paper 159a • Xu Chen*, Philip Morris USA Postgraduate Research Program, W. G. Chan, M .Hajaligo, Philip Morris USA Research Center

Solubility of Formaldehyde and Trioxane in Aqueous Solutions • 8:30 AM • paper 159b • Thomas Gruetzner*, Hans Hasse, Institute of Thermodynamics and Thermal Process Engineering, University of Stuttgart

Measurement and Correlation of Henry's Constants of Volatile Organic Compounds in Aqueous Salt Solutions • 8:55 AM • paper 159c • James B. Falabella*, Xin-Sheng Chai, Amyn S. Teja, Georgia Institute of Technology

Phase Behaviors of Solid Polymer Electrolytes/Salt System in Lithium Secondary Battery by Group-Contribution Method • 9:20 AM • paper 159d • Jae Ho Joo, Young Chan Bae*, Hanyang University

The Cybotactic Structure in Gas-Expanded Liquids: Numerical Simulations • 9:45 AM • paper 159e • Rigoberto Hernandez*, Alexander V. Popov, Charu L. Shukla, Jason P. Hallett, Charles L. Liotta, Charles A. Eckert, Georgia Institute of Technology

Vapor-Liquid-Liquid Equilibria of Carbon Dioxide-Organic Water Systems • 10:10 AM • paper 159f • Jason P. Hallett*, David Bush, Michael J. Lazzaroni, Charles L. Liotta, Charles A. Eckert, Georgia Institute of Technology

Structure-Based Generalizations of NRTL Parameters • 10:35 AM • paper 159g • Devipriya Ravindranath*, Srinivasa S. Godavarthy, Robert L. Robinson Jr., Khaled A. M. Gasem, Oklahoma State University, School of Chemical Engineering

[160] Monday, April 11, 2:00 PM
Hyatt Regency Atlanta, Techwood

Thermodynamics and Phase Equilibria II

Khaled A. M. Gasem, *Chair*
Oklahoma State University,
School of Chemical Engineering
Manolis M. Tomadakis, *Vice-Chair*
Florida Institute of Technology,
Dept. of Chemical Engineering

Sponsored by
Engineering Sciences and Fundamentals

Thermodynamic Expression of Electrolyte Solution • 2:05 PM • paper 160a • Shuzo Ohe*, Science University of Tokyo

Phase Behavior Prediction from a New Pressure-Dependent Excess Gibbs Energy Model • 2:30 PM • paper 160b • Esam Z. Hamad*, S. M. Waziri, King Fahd University of Petroleum & Minerals

Using the Monte Carlo Simulation Code Towhee to Predict Thermodynamic Properties of Fluids • 2:55 PM • paper 160c • Marcus G. Martin*, Sandia National Laboratories

Trends in Thermodynamic Perturbation Terms Based on Step Potential Equilibria And Dynamics: The SPEAD Model • 3:20 PM • paper 160d • Neil H. Gray, J. Richard Elliott*, The University of Akron, Dept. of Chemical Engineering

Direct Calculation of Phase Equilibria from Transition Matrix Monte Carlo Simulation • 3:45 PM • paper 160e • Jeffrey R. Errington*, University at Buffalo

Simultaneous Heats and Free Energies of Mixing from the SPEAD Model • 4:10 PM • paper 160f • J. Richard Elliott*, Neil H. Gray, Amanda Sans, The University of Akron, Dept. of Chemical Engineering

Extending the Scaled-Variable-Reduced-Coordinate (SVRC) Framework to Mixtures • 4:35 PM • paper 160g • Srinivasa S. Godavarthy*, Robert L. Robinson Jr., Khaled A. M. Gasem, Oklahoma State University, School of Chemical Engineering

[161] Tuesday, April 12, 8:30 AM
Hyatt Regency Atlanta, Techwood

Thermodynamics for Process Design and Simulation

J. Richard Elliott, *Chair*
The University of Akron,
Dept. of Chemical Engineering
Paul M. Mathias, *Vice-Chair*

Sponsored by
Engineering Sciences and Fundamentals

Phase Equilibria and Thermodynamic Properties of the Sulfur-Iodine Cycle* • 8:35 AM • paper 161a • Paul M. Mathias*, Lloyd C. Brown, General Atomics

Advanced Crystallization Modeling for Aqueous Electrolyte Solutions • 9:10 AM • paper 161b • Steven C. Lythgoe*, OLI Systems, Inc.

Transferable Step Potentials for Aldehydes, Phenols and Halocarbons • 9:45 AM • paper 161c • J. Richard Elliott*, F. Suhan Baskaya, The University of Akron, Dept of Chemical Engineering

A Phenomenological Molecular Dynamics Model for Gas-Expanded Liquids • 10:20 AM • paper 161d • Charu L Shukla*, Alexander V. Popov, Jason P. Hallett, Rigoberto Hernandez, Charles L. Liotta, Charles A. Eckert,Georgia Institute of Technology: School of Chemical and Biomolecular Engineering

Generalized SVRC-QSPR Predictions of Saturated Vapor Densities • 10:55 AM • paper 161e • Srinivasa S. Godavarthy, Devipriya Ravindranath*, Robert L. Robinson Jr., Khaled A. M. Gasem, Oklahoma State University, School of Chemical Engineering

[162] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Techwood

Phase Equilibria and Fluid Properties of Polymers and Heavy Oils

Ram B. Gupta, *Chair*
Auburn University
Kenneth R. Cox, *Vice-Chair*
Rice University, Chemical Engineering Dept.

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Engineering Sciences and Fundamentals

Removal of Asphaltene Fouling from Formation Minerals in Oil and Gas Wells • 2:05 PM • paper 162a • Kenneth M. Barker*, Baker Hughes/Baker-Petrolite, Michael E. Newberry, Baker Petrolite

Viscosity Reduction of Crude Oil Using Low Frequency Acoustic • 2:30 PM • paper 162b • Karthick Babu Poosekar, Robert W. Peters*, University of Alabama at Birmingham

A Quartz Crystal Microbalance Study of Adsorption Phenomena at Oil/Water Interfaces: Implications for Stability of Water in Oil Emulsions • 2:55 PM • paper 162c • Lamia Goual*, Geza Horvath-Szabo, Jacob Masliyah, University of Alberta

Survival Time and Viscous Permeability in Random Non-Overlapping and Partially Overlapping Fiber Structures • 3:20 PM • paper 162d • Manolis M. Tomadakis*, Florida Institute of Technology, Dept. of Chemical Engineering, Teri J. Robertson, ENSCO, Inc.

Correlation and Prediction of Hydrocarbon Thermal Conductivity Using the SPEAD Model • 3:45 PM • paper 162e • Z. Nevin Gerek, Neil H. Gray, J. Richard Elliott*, The University of Akron, Dept. of Chemical Engineering

Modified Solubility Parameters of Light Gases and a Predictive Model for Gas Solubility in Petroleum and Coal Liquid Fractions • 4:10 PM • paper 162f • M. R. Riazi*, Kuwait University, J. H. Vera, McGill University

[163] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Techwood

Prediction and Correlation of Transport Properties

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Engineering Sciences and Fundamentals

[165] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Learning Center

Separation Tutorial

Priscilla J. Hill, *Chair*
Mississippi State University

Sponsored by **Separations Div.**

Batch Crystallization Tutorial • 8:05 AM • paper 165a • Priscilla J. Hill*, Mississippi State University

Membranes for Liquid-Based Separation Applications • 8:50 AM • paper 165b • D. Bhattacharyya*, University of Kentucky

Adsorption Tutorial • 9:35 AM • paper 165c • James A. Ritter*, University of South Carolina

[167] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Spring

Applications of Advanced Process Control

Jay H. Lee, *Chair*
Georgia Institute of Technology
Martha Gallivan, *Vice-Chair*
Georgia Institute of Technology
School of Chemical and Biomolecular Engineering

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Computing and Systems Technology Div.

On-line Optimization via Off-line Optimization! A Guided Tour to Multi-Parametric Mixed Integer and Continuous Programming • 8:30 AM • paper 167a • Stratos Pistikopoulos*, Centre for Process Systems Engineering, Dept. of Chemical Engineering, Imperial College London

Control of Industrial Fermentation • 8:50 AM • paper 167b • Sten B. Jorgensen*, Jan Kamyno Rasmussen, Technical University of Denmark

H-Infinity Control Design for a Stationary Fuel Cell Power Plant • 9:10 AM • paper 167c • Mithun Kamat*, UTC Fuel Cells, Subbarao Varigonda, Scott Bortoff, United Technologies Research Center

Successful Industrial Key Studies of Integrated Design and Control • 9:30 AM • paper 167d • Myrian Schenk*, Air Products plc, Vassilis Sakizlis, Pinky Dua, Michael C. Georgiadis, Stratos Pistikopoulos, Imperial College London, Centre for Process Systems Engineering, Dept. of Chemical Engineering

Reactor Control Using an Infinite Horizon Model Predictive Controller • 9:50 AM • paper 167e • Michelle H. Caveness*, James J. Downs, Eastman Chemical Co.

Application of Global Optimization Methods for Control and Identification • 10:10 AM • paper 167f • Edward P. Gatzke*, Christopher E. Long, University of South Carolina

On-line Identification and Control of pH in a Neutralization Reactor of a Waste Water Treatment Plant Using an Identification Reactor • 10:30 AM • paper 167g • Canan Ozgen*, metu

Robust Internal Model Control of Distributed Parameter Systems • 10:50 AM • paper 167h • Qiuping Hu*, Ngee Ann Polytechnic, Singapore

Heat Exchange Equipment Hydraulic Lag Compensation • 11:10 AM • paper 167i • Michael DeLange*, Dow Reichhold Specialty Latex LLC

[168] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Spring

Applications of SPC/TQC/Six Sigma

Jay H. Lee, *Chair*
Georgia Institute of Technology
Martha Gallivan, *Vice-Chair*
Georgia Institute of Technology
School of Chemical and Biomolecular Engineering

Sponsored by
Computing and Systems Technology Div.

A Tutorial In System Identification Under Serially Correlated Noise Using Statistically Design • 2:05 PM • paper 168a • Derrick K. Rollins*, Iowa State University

Application of Six Sigma Tools in Technical Marketing for Top Line Growth • 3:05 PM • paper 168b • Keisha M. Wilson*, DuPont Packaging & Industrial Polymers

Optimal Design for an Ultrafiltration Process at the Hanford Department of Energy Facility • 3:30 PM • paper 168c • Henry C. Foust*, Tulane University, Ramani Kandiah, Northeastern University

System Identification — A Tutorial • 3:55 PM • paper 168d • Jay H. Lee*, Georgia Institute of Technology

[170] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Inman

Innovation in Process Intensification I

Jae W. Lee, *Chair*
The City College of the
City University of New York
Osman T. Aboul-Nasr, *Vice-Chair*
Fluor

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Co Sponsored by **18j — Research and New Technology Committee**

Process Intensification Using Sonochemical Reactors: Scale Up Aspects • 8:00 AM • paper 170a • Parag R. Gogate*, Aniruddha B. Pandit, Institute of Chemical Technology, University of Mumbai

Generating Feasible Design Alternatives for Integrated Reaction and Separation Systems • 8:25 AM • paper 170b • James Chin*, The City College of New York, Jae W. Lee, The City College of the City University of New York, Dept. of Chemical Engineering

Minimizing Reaction Times for the Kolbe-Schmitt Synthesis with Resorcinol and the Bromination of Toluene and Derivatives Using High p,T-Processing in a Micro-Reactor Setup • 8:50 AM • paper 170c • Volker Hessel*, C. Hofmann, J. Löhndorf, H. Löwe, K. Mazanek, H. Klefenz, IMM Institute for Microtechnology Mainz GmbH, P. Löb, Lob

A New Pressure Resistant Small Scale Reaction Calorimeter That Combines the Principles of Power Compensation and Heat Balance (CRC.v4). • 9:15 AM • paper 170d • Fabio Visentin*, Konrad Hungerbühler, Oemer M. Kut, ETHZ

Integrated Process for Simultaneous Gas Hydrate Formation and Separation • 9:40 AM • paper 170e • Sangyong Lee*, Texas A&M University, Prasad Yedlapalli, City College of New York, Raxit Mehta, Mehta, Jae W. Lee, The City College of the City University of New York, Dept of Chemical Engineering

Microchannel Catalytic Distillation • 10:05 AM • paper 170f • Ward E. TeGrotenhuis*, Susie Stenkamp, Battelle-PNNL, Robert A. Dagle, Pacific Northwest National Laboratory

[171] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Inman

Innovation in Process Intensification II

Jae W. Lee, *Chair*
The City College of the
City University of New York
Osman T. Aboul-Nasr, *Vice-Chair*
Fluor

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Processes for Making Tackifier Dispersions Used in the Synthesis of Pressure Sensitive Adhesives • 2:00 PM • paper 171a • Rakesh K. Gupta*, West Virginia University, Earl G. Melby, Dyna-Tech Adhesives, Bassam J. Jody, Argonne National Laboratory, Wayne Song, Mays Microsystems, Inc., Daniel De Kee, Tulane University

Millisecond Oxidation of Alkanes • 2:25 PM • paper 171b • Anne Gaffney*, Abraham Benderly, Rohm and Haas Co., Nitin Chadda, Chadda, Jordan Lampert, Wolfgang Ruettinger, Engelhard Corp., Dionisios Vlachos, University of Delaware

Making Compact Heat Exchanger Reactors More Flexible • 2:50 PM • paper 171c • Maulik R. Shelat*, Paul N. Sharratt, The University of Manchester

Dynamic Performance of a High Temperature Check Valve and Initial Testing of a Ceramic Ball Valve • 3:15 PM • paper 171d • James E. Smith, Jr.*, Bart Thomas Johnson, Madan Gopal, University of Alabama in Huntsville

How Much Power Can Be Put in with Impeller Type Mixers for Process Intensification in Small and Large Tanks? • 3:40 PM • paper 171e • James Y. Oldshue*, Oldshue Technologies International

Selecting Proper Heat Exchanger for Viscous Applications • 4:05 PM • paper 171f • Angelia M. Wepener, Angelia*, Sulzer Chemtech

[172] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Kennesaw

Fuel Cell and Gas to Liquid Fuels Pilot Plants

Ramesh Rameswaran, *Chair*
Lyondell Chemical Co.
David Edwards, *Vice-Chair*
Zeton Inc.

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Co Sponsored by **16e — New Technology and Developments**
Co Sponsored by **TD — Path Forward to a Hydrogen Economy**

Pilot Plant Work in the Development of Fischer-Tropsch Technology • 8:35 AM • paper 172a • Elijah C. Philipp*, Rentech, Inc.

Testing of a 5 kW Solid Oxide Fuel Cell on Reformed Diesel Fuel • 9:15 AM • paper 172b • Lyman J. Frost*, Robert C. Carrington, Idaho National Laboratory, Rodger W. Mckain, SOFCO-EFS, Dennis Witmer, University of Alaska-Fairbanks

Scale Up and Operation of the Catoosa Demonstration Facility, a GTL Demonstration Plant • 9:55 AM • paper 172c • Juan R. Inga*, Inga

Magnetic Separation of Iron Catalysts from Fischer-Tropsch Wax • 10:35 AM • paper 172d • Robin R. Oder*, EXPORTech Co., Inc.

[173] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Kennesaw

Design for Six Sigma and Design for Manufacture

Helen H. Lou, *Chair*
Lamar University
Gavin P. Towler, *Vice-Chair*
UOP Innovation Group

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Co Sponsored by **10a — Systems and Process Design**

Tutorial on Design for Six Sigma • 8:40 AM • paper 173a • George W. Chollar*, Statistical Design Institute

[174] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Kennesaw

Innovation in Fuel Cell Development

Venkat Subramanian, *Chair*
Tennessee Tech University
Dept. of Chemical Engineering
Chusheng Wang, *Vice-Chair*
Tennessee Technological University

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Co Sponsored by **TD — Path Forward to a Hydrogen Economy**

Mathematical Model Development for Polymer Electrolyte Fuel Cell Simulation Using CFD Technique • 2:05 PM • paper 174a • Chi Seung Lee*, Sung Chul Yi, Hanyang University

Microfabricated Fuel Cells with Thin-Film Silicon Dioxide Proton Exchange Membranes • 2:35 PM • paper 174b • Christopher W. Moore, Jun Li, Paul A Kohl*, Georgia Institute of Technology

2-Dimensional Model of Partial Hydrogen Coverage • 3:05 PM • paper 174c • Thomas F. Fuller*, Georgia Institute of Technology

Modeling of a Direct Carbon Molten Carbonate Fuel Cell with Porous Bed Electrodes • 3:45 PM • paper 174d • Alan A. Kornhauser*, Ritesh Agarwal, Virginia Tech

Water Vapor Transfer Device Modeling • 4:15 PM • paper 174e • Yan Zhang*, John Fagley, Annette Brenner, General Motors Corp.

[175] Thursday, April 14, 8:30 AM Hyatt Regency Atlanta, University

Integrating Risk and Uncertainty Analysis in Chemical Manufacturing

Yinlun Huang, *Chair*
Wayne State University
Qiang Xu, *Vice-Chair*
Wayne State University
Sponsored by **Process Development Div.**

Application of CLP with Interval Labels-Based Software for Thermal Energy Consumption Targeting in Ethylene Plants Under Uncertainty • 8:30 AM • paper 175a • Mahmoud Bahy M. Noureldin*, Andrew Morrison, University of Waikato

Have You Thought of Integrating Environmental Compliance Requirements into Your Plant Design? • 8:55 AM • paper 175b • Nik Mukhopadhyay*, Conestoga-Rovers & Associates

Texaco's Troubles in Ecuador • 9:20 AM • paper 175c • Cheryl Teich, Rohm and Haas Co., Dave Russell*, GEO, Inc.

Nonlinearly Constrained Data Reconciliation by Newton-GMRES Iterative Method • 9:45 AM • paper 175d • Yangfei Pu*, Bingzhen Chen, Xiaorong He, Tsinghua University

[178] Monday, April 11, 8:00 AM Hyatt Regency Atlanta, Roswell

Rheology, Mixing, Transport, and Treatment of Non-Newtonian Slurries for Nuclear Waste Disposition

Dean E. Kurath, *Chair*
Battelle
William E. Daniel, *Vice-Chair*
Savannah River National Laboratory

Sponsored by **Nuclear Engineering Div.**

Pulse Jet Mixer Hybrid Mixing System Development to Support the Hanford Tank Waste Treatment & Immobilization Plant • 8:05 AM • paper 178a • Steve M. Barnes, Hani Abodishish, Clarence Corriveau, Bechtel, Gordon H. Beeman, Dean E. Kurath, Perry A. Meyer*, Gary Lynn Smith, Battelle, Arthur W. Etchells, DuPont Engineering Technology

Non-Newtonian Slurry Simulant Development and Selection for Pulse Jet Mixer Program • 8:27 AM • paper 178b • Adam P. Poloski*, Battelle-Pacific Northwest Div., Arthur W. Etchells, DuPont Engineering Technology, Lynette K. Jagoda, Pavel Hrma, Perry A. Meyer, Gary Lynn Smith, Battelle

Technical Basis for Testing Scaled Pulsed Jet Mixing Systems in Non-Newtonian Slurries • 8:49 AM • paper 178c • Perry A. Meyer*, Dean E. Kurath, Judith A. Bamberger, James A. Fort, Harry D. Smith, Jagannadha R. Bontha, Carl W. Enderlin Battelle, David A. Wilson, Savannah River National Laboratory, Arthur W. Etchells, DuPont Engineering Technology

Measurement Methods and Apparatus to Investigate Fluid Motion in Non-Newtonian Fluids • 9:11 AM • paper 178d • Michele Friedrich*, Lawrence A. Schienbein, Adam P. Poloski, Spyridon Tzemos, Robert P. Mueller, Stuart T. Arm, Richard S. Brown, Battelle-Pacific Northwest Div., Carl W. Enderlin, Judith A. Bamberger, Battelle

Results of Single Sparge Tube Non Newtonian Fluid Mixing Tests • 9:33 AM • paper 178e • Lawrence A. Schienbein*, Battelle Pacific Northwest Div.

Yield Stress Reduction of Radioactive Waste Slurries by Addition of Surfactants • 9:55 AM • paper 178f • Michael E. Stone*, Westinghouse Savannah River Co.

Kaolin Rheology Modifier Study for SRNL WTP Pulse Jets Tank Pilot Work in Support of RPP at Hanford • 10:17 AM • paper 178g • William E. Daniel*, Russ Eibling, Savannah River National Laboratory

Physical Properties of Hanford Radioactive Low Activity Waste Melter Feed Slurries • 10:39 AM • paper 178h • Erich K. Hansen, Charles L. Crawford, Westinghouse Savannah River Co.

[179] Monday, April 11, 2:00 PM Hyatt Regency Atlanta, Roswell

Generation, Retention, Release, and Control of Flammable/Toxic Materials at Defense Nuclear Facilities I

Randall Robinson, *Chair*
Defense Nuclear Facilities Safety Board
Dean E. Kurath, *Vice-Chair*
Battelle

Sponsored by **Nuclear Engineering Div.**

A Study of Gas Generation Rates for Selected HLW Processing Conditions • 2:03 PM • paper 179a • Reid A. Peterson*, S. A. Bryan, D. L. Blanchard, Pacific Northwest National Laboratory, Stuart T. Arm, Battelle-Pacific Northwest Div.

Gas Retention and Release in Pulse Jet Mixed Non-Newtonian Slurries • 2:25 PM • paper 179b • Perry A. Meyer*, Charles W. Stewart, Scot D. Rassat, Renee L. Russell, Consuelo E. Guzman-Leong, Matthew S. Fountain, Chris D. Johnson, Battelle

Large-Scale Non-Newtonian Gas Release Experiments • 2:47 PM • paper 179c • Yasuo Onishi*, D. Brent Barnett, Pacific Northwest National Laboratory, Matthew S. Fountain, Battelle, Michele Friedrich, Battelle-Pacific Northwest Div.

Hydrogen Hazards and Contols in High Level Waste • 3:09 PM • paper 179d • Randall Robinson*, J. W. Troan, R. B. Matthews, Defense Nuclear Facilities Safety Board

Gas Retention and Release Tests in Non-Newtonian Simulants at the Florida International University in Support of the Waste Treatment Plant at Hanford, WA. • 3:29 PM • paper 179e • P. S. Sundar*, Fredrick Damerow, River Protection Project-Waste Treatment Plant-Bechtel, Georgio Tachiev, Amer Awwad, Florida International University

Radiation and Nitric Acid Exposure Stability of Resorcinol-Formaldehyde • 3:51 PM • paper 179f • Fernando F. Fondeur*, Fondeur, William D. King, Westinghouse Savannah River

Ultrasonic Measurement of Gas Volume Fraction in Slurries • 4:13 PM • paper 179g • Brian J. Tucker*, Paul D. Panetta, Aaron A. Diaz, Kayte M. Judd-Denslow, Pacific Northwest National Laboratory

A Model for Air Stripping of Ammonia in an Agitated Vessel • 4:35 PM • paper 179h • Kofi Adu-Wusu*, Christopher J. Martino, William R. Wilmarth, Savannah River National Laboratory, William M. Bennett, Robert S. Peters, Westinghouse Savannah River Co.

[180] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Roswell

Generation, Retention, Release, and Control of Flammable/Toxic Materials at Defense Nuclear Facilities II

Randall Robinson, *Chair*
Defense Nuclear Facilities Safety Board
Dean E. Kurath, *Vice-Chair*
Battelle

Sponsored by **Nuclear Engineering Div.**

Radiolytic Hydrogen Generation in Savannah River Site (SRS) High Level Waste Tanks — Comparison of SRS and Hanford Modeling Predictions • 8:33 AM • paper 180a • Charles L. Crawford, Westinghouse Savannah River Co., N. E. Bibler, Savannah River National Laboratory

Copper Catalyzed Peroxide Oxidation Testing for Tetraphenylborate Decomposition in SRS Tank 48H • 8:58 AM • paper 180b • Dan Lambert*, Savannah River National Laboratory

NRC Involvement with the Proposed MOX Facility • 9:23 AM • paper 180c • Alexander Murray*, Sharon A. Steele, Norma Garcia-Santos, U.S. NRC

Regulatory Applications of Top-Level Fault Tree Analysis • 9:58 AM • paper 180d • Albert Wong*, Alexander Murray, Dennis Damon, U.S. Nuclear Regulatory Commission

Fire Protection Overview for the Mixed Oxide Fuel Fabrication Facility • 10:20 AM • paper 180e • Alexander Murray, Sharon A. Steele*, Norma Garcia-Santos, U.S. NRC

Analysis of Oxidation of Plutonium Alloys in Savannah River Site FB-Line Furnaces • 10:42 AM • paper 180f • James Laurinat*, Westinghouse Savannah River Co.

Evaluation Of Wetting Agents To Mitigate Dusting When Transferring Dry Glass Former Chemicals • 11:04 AM • paper 180g • Timothy M. Jones*, Erich K. Hansen, Westinghouse Savannah River Co.

[181] Tuesday, April 12, 2:00 PM Hyatt Regency Atlanta, Roswell

Advances in Separation and Immobilization of Nuclear Wastes

Bill E. Holtzscheiter, *Chair*
Savannah River National Laboratory
Michael R Poirier, *Vice-Chair*
Westinghouse Savannah River Co.

Sponsored by **Nuclear Engineering Div.**

Hydraulic Testing of Ion Exchange Resins for Cesium Removal from Hanford Tank Waste • 2:00 PM • paper 181a • Kriston P. Brooks*, Pacific Northwest National Laboratory

Alternative Ultrafiltration Membrane Testing for the SRS Baseline Process • 2:25 PM • paper 181b • Michael R. Poirier, Westinghouse Savannah River Co., R. Scott Herbst*, Nick R. Mann, Troy G. Garn, Idaho National Laboratory, Samuel D. Fink, Savannah River National Laboratory

Removal of Cesium from Nuclear Waste Solution Using Coarse SuperLig Resin • 2:50 PM • paper 181c • Kofi Adu-Wusu*, Neguib M. Hassan, Charles A. Nash, James C. Marra, Savannah River National Laboratory

Separations of a Simulated Waste Stream in a Pilot Waste Treatment Plant • 3:15 PM • paper 181d • Mark R. Duignan, Jack R. Zamecnik*, Michael R. Williams, Savannah River National Laboratory (WSRC)

Spherical Resorcinol-Formaldehyde Resin Testing for Cesium Removal from Hanford Tank Waste Simulants • 3:40 PM • paper 181e • S. K. Fiskum*, D. L. Blanchard, Pacific Northwest National Laboratory, M. R. Thorson, Bechtel National, Inc., M. J. Steele, K. K. Thomas, Battelle-PNNL

Thermodynamic Modeling of Comparative Melt Rates • 4:05 PM • paper 181f • Alexander S. Choi*, Savannah River National Laboratory

Development of a Rotary Microfilter to Increase Throughput in Solid-Liquid Separation Processes • 4:30 PM • paper 181g • Michael R. Poirier*, David Herman, Westinghouse Savannah River Co., Samuel D. Fink, Savannah River National Laboratory

[182] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Roswell

Chemical Engineering Advances in the Nuclear Fuel Cycle I

James Laidler, *Chair*
Candido Pereira, *Vice-Chair*
Argonne National Laboratory

Sponsored by **Nuclear Engineering Div**

Objectives, Strategies, and Challenges for the Advanced Fuel Cycle Initiative • 8:35 AM • paper 182a • Steven J. Piet*, Idaho National Laboratory

Process Development and Testing for Electrometallurgical Treatment of Spent Fuel • 9:00 AM • paper 182b • K. M. Goff*, K. L. Howden, G. M. Teske, T. J. Johnson, Argonne National Laboratory

Dissolution of Zircaloy Clad BWR Fuel • 9:25 AM • paper 182c • G. F. Kessinger*, Savannah River National Laboratory

Development of Technologies for the Simultaneous Separation of Cesium and Strontium from Spent Nuclear Fuel as Part of an Advanced Fuel Cycle • 10:05 AM • paper 182d • Jack D. Law*, R. Scott Herbst, Idaho National Laboratory, David H. Meikrantz, Dean R. Peterman, Catherine Riddle, Richard D. Tillotson, Terry A. Todd, INEEL

Design and Demonstration of the UREX+2 and UREX+4 Processes • 10:30 AM • paper 182e • Allen Bakel, Scott Aase, Delbert Bowers, Ralph Leonard, Mark Vander Pol, Candido Pereira*, George F. Vandegrift, Monica C. Regalbuto, Argonne National Laboratory

Design Attributes and Scale-up Testing of Annular Centrifugal Contactors • 10:55 AM • paper 182f • David H. Meikrantz*, Jack D. Law, INEEL

[183] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Roswell

Chemical Engineering Advances in the Nuclear Fuel Cycle II

James Laidler, *Chair*
Candido Pereira, *Vice-Chair*
Argonne National Laboratory

Sponsored by **Nuclear Engineering Div.**

Transmutation Fuel Fabrication at Los Alamos National Laboratory • 2:00 PM • paper 183a • Stephen P. Willson*, Los Alamos National Laboratory

Modeling of Multivalent Ion Exchange Between Molten Chloride Salt and Zeolite-A • 2:25 PM • paper 183b • Michael F. Simpson*, Argonne National Laboratory, Mary Lou D. Dunzik-Gougar, Idaho State University, Supathorn Phongikaroon, Argonne National Laboratory-West

High-Heat Generating Engineered Products and Facilities for Radioactive Decay Storage • 2:50 PM • paper 183c • James Laidler, George F. Vandegrift, Michael Kaminski*, Argonne National Laboratory

Beneficial Uses of Tails from Nuclear Fuel Production into Spent Fuel Storage Cask Manufacturing • 3:15 PM • paper 183d • Juan J. Ferrada*, Les R. Dole, Oak Ridge National Laboratory

[185] Tuesday, April 12, 8:30 AM Hyatt Regency Atlanta, Learning Center

Sensors

Veera Boddu, *Chair*
Jeffery P. Perl, *Vice-Chair*
Chicago Chem Consultants Corp

Sponsored by **Liaison Functions**

Recent Advances in Sensor Technology to Mitigate Terrorist Threats in Potable Water Distribution Systems • 8:30 AM • paper 185a • Mark

D. Ginsberg*, U.S. Army Corps of Engineers

In Situ Sensors for the Chemical Industry • 8:55 AM • paper 185b • James D. Tate*, Dow Chemical

Detection and Manipulation of Magnetic Nano-labels: Developing Fieldable Tools for Rapid Identification of Biothreat Agents • 9:20 AM • paper 185c • Mark Tondra*, NVE Corp.

Quantum Fingerprinting: Chem/Bio Sensing • 9:50 AM • paper 185d • Mark A. Prelas*, Tushar K. Ghosh, Dabir Viswanath, Sudarshan Loyalka, Robert V. Tompson, Angel Velez, Saha Krishnendu, Alexis Sotomayor, Nuclear Science and Engineering Institute

Investigating Bacterial Endospore Viability using Hyperspectral Techniques • 10:15 AM • paper 185e • C. M. Reynolds*, G. G. Koenig, D. B. Ringelberg, ERDC-CRREL, J. E. Anderson, ERDC-TEC

Microfluidic Lead Sensor Incorporating Catalytic DNA • 10:40 AM • paper 185f • Don Cropek*, ERDC-CERL, Paul Bohn, Yi Lu, Jonathan Sweedler, In-Hyoung Chang, University of Illinois Urbana-Champaign

Development of a Magnetic Bead-Based Biosensor for the Long Term Monitoring of Ordnance Related Compounds in Groundwater • 11:05 AM • paper 185g • Shana R. Dalton*, Denise K. MacMillan, U.S. Army Corps of Engineers

[186] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Marietta

Pharmaceutical Water Technology I

Alex J. Konopka, *Chair*
Eli Lilly and Co.
Philip E Sumner, *Vice-Chair*
Pfizer

Sponsored by **Liaison Functions**

Analytical On-Line Process Measurements for Pharmaceutical Waters • 8:45 AM • paper 186a • Anthony C. Bevilacqua*, Mettler-Toledo Thornton

Pharmaceutical Water System Classification, Impact Assessment, Commissioning/Qualification Issues, Etc. • 9:45 AM • paper 186b • Philip E. Sumner*, Pfizer

Analysis of Operating Pharmaceutical Water Systems • 10:45 AM • paper 186c • Peter Vishton*, Wyeth Pharmaceuticals

[187] Wednesday, April 13, 8:30 AM Hyatt Regency Atlanta, Learning Center

Ionic Liquids

Sharon M. Robinson, *Chair*
Oak Ridge National Laboratory
Emory Ford, *Vice-Chair*
Sponsored by **Liaison Functions**

Accelerating Ionic Liquid Commercialization • 8:40 AM • paper 187a • Ford Emory*, Materials Technology Institute, Bill Choate, BCS, Inc., Sharon M. Robinson, Oak Ridge National Laboratory, Francis Via, Fairfield Resources

Opportunities for Ionic Liquid Commercialization • 9:05 AM • paper 187b • Philip E Rakita*, Armour Associates, Ltd.

Ionic Liquids in Industrial Applications: A World Full of Opportunities • 9:55 AM • paper 187d • Bernd Weyershausen*, Kathrin Lehmann, Degussa AG, Business Unit Oligomers & Silicones

Ionic Liquid Research in the Petrochemical Industry • 10:20 AM • paper 187e • Christian P. Mehnert*, ExxonMobil Chemical Co.

Ionic Liquids Roundtable Discussion • 10:45 AM • paper 187f • Emory Ford*, Materials Technology Institute, Sharon M. Robinson, Oak Ridge National Laboratory

[188] Wednesday, April 13, 2:00 PM Hyatt Regency Atlanta, Marietta

Pharmaceutical Water Technology II

Alex J. Konopka, *Chair*
Eli Lilly and Co.
Philip E. Sumner, *Vice-Chair*
Pfizer

Sponsored by **Liaison Functions**

USP Water for Injection Methods of Production • 2:00 PM • paper 188a • Gary V. Zoccolante*, USFilter

Operations/Maintenance/Routine Performance Evaluation for Pharmaceutical High Purity Water Generation and Distribution Systems • 3:00 PM • paper 188b • Robert M. Augustine*, Eli Lilly and Co.

Rouging of Stainless Steel in Pharmaceutical Systems • 4:00 PM • paper 188c • John C. Tverberg*, Metals & Materials Consulting Engrs.

Rouge: Issues Facing The Pharmaceutical and Biotech industries • 5:00 PM • paper 188d • Patrick H Banes*, Oakley Specialized Services, Inc.

Safety Professionals

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Join us in Atlanta, GA April 10-13, 2005 as the world's leading experts in process safety meet. Highlights include:

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Bhopal and Its Effects on Process Safety Worldwide

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Nurturing Strong Process Safety Culture

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ATTENDEE INFORMATION (Please Print Clearly!) :

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Guest name *Note: Guests are not invited to attend technical sessions* Nickname for badge

PRIMARY AREA OF INTEREST (Check one) :

☐ Industry ☐ Government ☐ Academia ☐ Student ☐ Other

American Filtration Society Attendance

For admission to American Filtration Society Technical Sessions (full meeting or one day only) please refer to the ticketed events section and check appropriate areas. (You must be an AIChE meeting registrant to excercise this option).

REGISTRATION FEES*

Please Circle Appropriate Fee(s)

	EARLY Postmarked thru February 25		STANDARD Postmarked thru April 7		ON-SITE	
	member	nonmember	member	nonmember	member	nonmember
☐ Full Meeting	$525	$750	$575	$800	$615	$850
☐ One Day Only*	$265	$370	$290	$395	$315	$420
☐ Emeritus	$99	$99	$99	$99	$99	$99
☐ Graduate Student/Full Meeting	$250	$345	$275	$370	$305	$395
☐ Graduate Student/One Day*	$125	$175	$140	$185	$150	$200
☐ Undergraduate Student/Full Meeting	$40	$60	$50	$70	$60	$80
☐ Unemployed Members**	$105	N/A	$105	N/A	$105	N/A
☐ Guest/Full Meeting	$60	$60	$60	$60	$60	$60
☐ Guest/One Day*	$20	$20	$20	$20	$20	$20

*ONE DAY ATTENDEES — Check attendance day: ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday

**Members who are listed as unemployed in AIChE records.

NOTE: 50-year members and Founders Award recipients receive free registration. (Guests must pay appropriate fee.)

I AM: ☐ 50-Year Member ☐ Founders Award Recipient

OTHER MEMBER RATES: (Please see member rates above) ☐ NPRA ☐ ACS ☐ A&WMA ☐ ASME ☐ DOE ☐ NAAChE ☐ IMM
(excluding graduate students) ☐ IchemE ☐ IAHE ☐ AFS ☐ U.S. Fuel Cell Council ☐ EPA ☐ DECHEMA ☐ Battelle

* A $5.00 Centennial Celebration Fund fee has been added to the registration fee.

TICKETED EVENTS (Open to all) :

Space for some events is limited and tickets will be sold on a first-come, first-served basis.
Any of the events may be cancelled without prior notice; events will only be held if ticket sales indicate sufficient interest.
Note: Vegetarian options available. Please check off and indicate number requested where needed.

Date	Item #	Description	Vegetarian	# of Tickets	Price	Total
Mon.-Wed.	☐ 100	American Filtration and Separations Society Conference Sessions			$100	
April 11-13		(Special Note: You must be a registered AIChE Spring Meeting				
		Attendee to attend these sessions) **Full Meeting**				
Mon., April 11	☐ 101	Global Congress on Process Safety Luncheon - Hyatt Regency, 12:15pm			$45	
	☐ 102	Distillation Ticketed Dinner - AZIO Downtown Atlanta, 6:30pm Dinner			$38	
	☐ 103	Fuels & Petrochemicals Award Ticketed Dinner - Ray's In The City,			$45	
		Downtown Atlanta, 6:00pm Cash Bar, 6:45pm Dinner				
	☐ 104	Chinese American Chemical Society Social Hour and Ticket Dinner			$30	
		HSU's Gourmet, Downtown Atlanta, 6:00pm Social Hour, 7:30pm Dinner				
	☐ 105	Safety & Health Division Ticketed Dinner-Trader Vics, Downtown, 6:30pm Dinner			$50	
	☐ 106	Transport and Energy Process (TEP) Dinner - Pittypat's Porch,			$40	
		Downtown Atlanta, 6:30pm Dinner				
	☐ 107	American Filtration and Separations Society Conference Sessions			$50	
		(Special Note: You must be a registered AIChE Spring Meeting				
		Attendee to attend these sessions) **Monday Only**				
Tues., Apr 12	☐ 201	AIChE Fellows Breakfast - Hyatt Regency Atlanta			$25	
	☐ 202	Nuclear Engineering Division Robert E. Wilson Award Luncheon -			$30	
		PittyPat's Porch, Downtown Atlanta, 12:00pm				
	☐ 203	Global Congress on Process Safety Luncheon - Hyatt Regency, 12:15pm			$45	
	☐ 204	Ethylene Conference Ticketed Lunch - AZIO Downtown, 12:15pm Lunch			$37	
	☐ 205	Gas Utilization Topical Ticketed Event - Lunch - Ray's In the City,			$35	
		Downtown Atlanta, 11:30am Lunch				
	☐ 206	Management Division Ticketed Dinner - PittyPat's Porch,			$40	
		Downtown Atlanta, 6:30pm Dinner				
	☐ 207	Process Development Division Ticketed Dinner - Max Lager's American			$50	
		Grill & Brewery, Downtown Atlanta, 7:30pm Dinner				
	☐ 208	American Filtration and Separations Society Conference Sessions			$50	
		(Special Note: You must be a registered AIChE Spring Meeting				
		Attendee to attend these sessions) **Tuesday Only**				
Wed., Apr 13	☐ 301	Global Congress on Process Safety Luncheon - Hyatt Regency, 12:15pm			$45	
	☐ 302	IMRET Ticketed Dinner - Ray's In the City, Downtown Atlanta, 6:30pm Dinner			$45	
	☐ 303	Sustainability and Green Engineering: Coming of Age Ticketed Dinner - AZIO			$38	
		Downtown Atlanta, 6:30pm Dinner				
	☐ 304	Dinner and Comedy Hour with AIChE Member Pete Ludovice -			$40	
		Max Lager's American Grill, Downtown Atlanta, 6:30pm Dinner				
	☐ 305	American Filtration and Separations Society Conference Sessions			$50	
		(Special Note: You must be a registered AIChE Spring Meeting				
		Attendee to attend these sessions) **Wednesday Only**				

SPRING MEETING SHORT COURSES (OPEN TO ALL – FULL MEETING REGISTRATION NOT REQUIRED)

PROFESSIONAL DEVELOPMENT HOURS CERTIFICATES WILL BE DISTRIBUTED TO REGISTRANTS.

☐ S1	Investigating Process Safety Incidents (9:00am- 5:00pm)	Sun., Apr. 10	$495	
☐ S2	High Integrity Safety Interlock Design (ISA-84) (9:00am- 5:00pm)	Sun., Apr. 10	$495	
☐ S3	Preventing Human Error (9:00am- 5:00pm)	Sun., Apr. 10	$495	
☐ S4	Dust Explosions: Fundamentals and Modern Developements (9:00am- 4:30pm)	Sun., Apr. 10	$495	
☐ S5	What Went Wrong? Chemical Plant Accidents: A Workshop on Causes and Prevention (9:00am- 5:00pm)	Sun., Apr. 10	$449	
☐ S6	Fieldbus and AIChE: A learning Experience (9:00am- 5:00pm) $495 Regular Fee $395 for Students	Sun., Apr. 10	$495	
☐ S7	Using Physical Property Models for Process and Product Developement (9:00am- 12:00pm)	Sun., Apr. 10	$299	
☐ S8	The Professional Excellence Seminar: A Seminar on Roles and Responsibilities of Engineers, and Professional Ethics (9:00am- 11:00am)	Sun., Apr. 10	$99	
☐ S9	Advances in Heat Exchanger Technology - Compact and Enhanced Heat Exchangers for Process Industry (9:45am- 4:15pm)	Sun., Apr. 10	$379	
☐ S10	Sustainability Workshop 1: The Science Behind Sustainability (9:00am- 12:00pm)	Sun., Apr. 10	$100	
☐ S11	Sustainability Workshop 2: The Business Case for Sustainability (1:00- 4:00pm)	Sun., Apr. 10	$100	
☐ S12	Sustainability Workshop 3: Applications of Sustainability in Industry (7:00pm- 9:30pm)	Tues., Apr 12	$100	
☐ S13	Sustainability Workshop 4: Individual Acivism (7:00pm- 9:30pm)	Wed., Apr 13	$100	
☐ S14	Process Development: From Innovation to Manufacturing,The Path Forward (2:00pm- 5:00pm) Pre-Registration Required	Tues., Apr 12	**No Charge**	
☐ S15	Chemical Reactivity Hazard Management Tutorial for Chemical Handlers (8:30am- 4:45pm)	Wed., Apr 13	$50	
☐ S16	Advanced Chemical Reactivity Hazard Management (9:00am- 5:00pm)	Thur., Apr 14	$495	
☐ S17	Fundamentals of Process Safety (9:00am- 5:00pm)	Thur., Apr 14	$495	

SPRING MEETING PROCEEDINGS: CD-ROM & PRINT VOLUMES

☐ PPA	**2005 SPRING NATIONAL MEETING CONFERENCE PROCEEDINGS CD-ROM -** *This CD-ROM will be organized by topical conference, and will include all papers/abstracts properly submitted for topical conferences and unaligned sessions with permission to reproduce.*	$80

The following PRINT and CD combination proceedings will be available on-site

☐ PPB	39th Loss Prevention Symposium (print volume plus a CD containing only LPS papers)	$100
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☐ PPF	CCPS 20th Annual International Conference Proceedings (Hardcover Print Volume)	$105
☐ PPG	CCPS/LPS 2004-2005 Enhanced Proceedings CD-ROM	$75
☐ PPI	Distillation Conference Proceedings (Print Volume to be mailed post-conference)	$90

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Cancellations received in writing to AIChE and postmarked no later than March 11, 2005 will receive a full refund less $50 in processing charges. Full payment of fees must accompany this registration form.