



THIRTY - SECOND - ANNUAL
INTERNATIONAL PITTSBURGH
COAL CONFERENCE

University of Pittsburgh - Swanson School of Engineering

FINAL PROGRAM

**COAL - ENERGY, ENVIRONMENT AND
SUSTAINABLE DEVELOPMENT**



October 5 - 8, 2015
Pittsburgh, PA USA
The David L. Lawrence Convention Center



Hosted By:
University of Pittsburgh
Swanson School of Engineering



WELCOME!

On behalf of the Conference Advisory Board, Conference Committees, and the University of Pittsburgh we welcome you to the Thirty-Second Annual International Pittsburgh Coal Conference held October 5 - 8, 2015 at the David L. Lawrence Convention Center in Pittsburgh PA. The Conference is hosted by the University of Pittsburgh.

The theme of this year's conference is "Coal - Energy, Environment and Sustainable Development" which covers a wide spectrum of important topics on coal technology, synfuel and environmental issues. The topics cover energy and environmental issues and technologies related to coal and its byproducts. Over 300 technical papers and posters will be presented throughout the conference. The Poster Sessions will be held on Wednesday, October 7 from 18:00 - 21:00. For detailed information on technical sessions, papers and speakers, please turn to page 6 in the Technical Program.

The invited Plenary Speakers include: Dr. Grace M. Bochenek, Director, National Energy Technology Laboratory (NETL), USA; Mr. Richard A. Winschel, Director of Research and Development, CONSOL Energy, USA; Mr. Vann Bush, Managing Director of Energy Supply and Conversion, Gas Technology Institute, USA; Mr. Norman Kettenbauer, Vice President - Engineering & Contracting, Longview Power, LLC, USA; Dr. Lesley Sloss, Principal Environmental Consultant, IEA CCC, and Lead of the Coal Partnership area at the UN Environmental Programme, UK; Prof. Frans Waanders, Professor and Director, School of Chemical and Minerals Engineering, North-West University, SOUTH AFRICA; Prof. Farid A. Malik, Forman Christian College (American University), PAKISTAN; Mr. James Van Nostrand, Director, Center for Energy and Sustainable Development, USA; Mr. John Pippy, CEO, Pennsylvania Coal Alliance, USA; and Dr. Daman S. Walia, President and CEO, ARCTECH Inc., USA.

We express our sincere gratitude to the contributors for their support and involvement, to all the authors and co-authors of the technical papers and to all the members of the Program Committee, Awards Committee, International Committee and Membership Committee. Special thanks go to our Technical Program Chairs, Evan Granite of NETL-DOE, USA; Jim Hower of the University of Kentucky, CAER, USA; and Gary Stiegel, Consultant, USA, as well as to all session chairs, speakers and international delegates for their contributions to the 2015 technical program.

As the chair of the Advisory Board of the Conference, I deeply appreciate your participation and interest in this year's Conference and invite you to join us next year for the Thirty-Third Annual International Pittsburgh Coal Conference, which will be held in Cape Town, SOUTH AFRICA from August 8 - 12, 2016.



Richard Winschel, Chair
CONSOL Energy Inc., Pittsburgh, PA, USA

CONFERENCE REGISTRATION

On-Site Registration will begin Monday, October 5, from 15:00 - 19:00 and continues Tuesday, Wednesday, and Thursday from 7:00 until 17:00.

Please check in even if you have Pre-Registered!

Gateway Clipper Dinner Cruise
Tuesday, October 6

5:45 PM - Meet in Westin Hotel lobby for a short walk to the boarding dock

6:00 - 6:30 PM - Boarding at the dock by the David L. Lawrence Convention Center

6:30 PM - 9:00 PM - Dinner and cruising

9:00 PM - Return to dock

This cruise is complimentary for paid conference attendees, but there is a charge of \$45 to bring a spouse or friend. Please RSVP to the conference secretary.

The International Pittsburgh Coal Conference

EXECUTIVE DIRECTOR:
Dr. Badie I. Morsi

CONFERENCE ORGANIZER:
Mrs. Heidi M. Peck

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PITT AWARD

The Award for Innovation in Coal Conversion was founded by the Chemical and Petroleum Engineering Department, University of Pittsburgh in 1983 with industrial support. Since 1992, it has been fully funded by CONSOL Energy Inc.

CONFERENCE OVERVIEW

MONDAY, OCTOBER 5, 2015

Technical Tour	07:15 - 16:00
Registration	15:00 - 19:00
Reception	18:30 - 20:30

TUESDAY, OCTOBER 6, 2015

Registration	07:00 - 17:00
Opening Ceremony	08:00 - 08:10
Plenary Session – 1	08:10 - 10:05
Concurrent Tech. Sessions	10:20 - 12:00
Conference Luncheon	12:00 - 13:30
Concurrent Tech. Sessions	13:30 - 17:05
Gateway Clipper Dinner Cruise	18:00 - 21:00

WEDNESDAY, OCTOBER 7, 2015

Registration	07:00 - 17:00
Plenary Session – 2	08:20 - 10:05
Concurrent Tech. Sessions	10:20 - 12:00
Conference Luncheon	12:00 - 13:30
Concurrent Tech. Sessions	13:30 - 17:05
Poster Session	18:00 - 21:00

THURSDAY, OCTOBER 8, 2015

Registration	07:00 - 17:00
Plenary Session – 3	08:20 - 10:05
Concurrent Tech. Sessions	10:20 - 12:00
Awards Luncheon	12:00 - 13:30
Concurrent Tech. Sessions	13:30 - 17:05
Advisory Board Meeting	18:00 - 20:00

PLENARY SPEAKERS

TUESDAY, OCTOBER 6, 2015

Dr. Grace M. Bochenek
Director

National Energy Technology Laboratory, USA
“Backbone of the Energy Future”

Mr. Richard A. (Dick) Winschel

Director, Research & Development
CONSOL Energy Inc., USA

“U.S. Coal – An Industry in Transition”

Mr. Vann Bush

Managing Director, Energy Supply and Conversion
Gas Technology Institute, USA

“Finding Coal’s Future”

Mr. Norman Kettenbauer

Vice President - Engineering & Contracting
Longview Power, LLC, USA

“Longview Power – Reliable, Economic, Clean Coal”

WEDNESDAY, OCTOBER 7, 2015

Dr. Lesley Sloss

Principal Environmental Consultant IEA CCC, UK
Lead - Coal Partnership area at UN Environment Programme
Advisory Board – Center for International Energy Policy,
SCOTLAND

“Coal - Its Future in an Increasingly Legislated Environment”

Prof. Frans Waanders

Professor and Director

School of Chemical and Minerals Engineering
North-West University, SOUTH AFRICA

“Coal Utilization in an Uncertain Economic World”

Prof. Farid A. Malik

Professor

Forman Christian College (American University)
Lahore, PAKISTAN

“Use of Coal in the Energy Mix of Pakistan”

THURSDAY, OCTOBER 8, 2015

Prof. James Van Nostrand

Director, Center for Energy and Sustainable Development
West Virginia University College of Law, USA

“Response of the Coal Industry to the EPA’s Clean Power Plan:
Litigate, Legislate, Retaliate, or Innovate?”

Mr. John Pippy

CEO

Pennsylvania Coal Alliance, USA

“The State of the PA Coal Industry Under Federal Regulations”

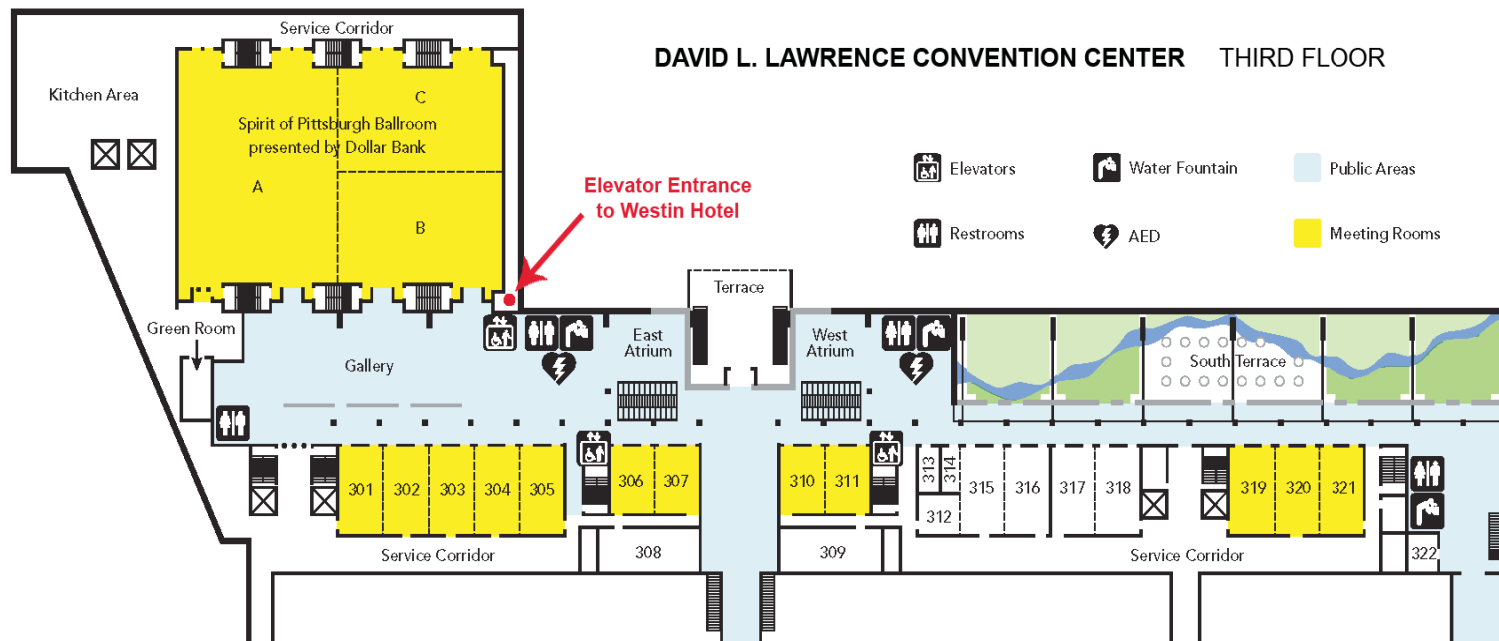
Dr. Daman S. Walia

President and CEO, ARCTECH Inc., USA

“Coal Biotechnology: a Creative Approach for Carbon
Reduction, Environmental Footprint, While Moving Coal Up the
Value Chain”

Monday, October 5, 2015						
7:15-16:00	Technical Tour – Longview Power					
15:00-19:00	Registration – Room 306					
18:30-20:30	Reception – Rooftop Terrace					
Tuesday, October 6, 2015						
7:00-17:00	Registration – Room 306					
8:00-8:10	Opening Ceremony – Ballroom					
8:10-10:05	Plenary Session – Ballroom					
10:05-10:20	Coffee Break					
ROOM	301	302	303	304	305	310/311
	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
10:20-12:00	Clean Coal Demonstration and Commercial Projects: DOE Projects	Coal Mining: Optimization of Mining Operations	Gasification Technologies: Advanced Technologies	Combustion Technologies: Flue Gas Cleanup	U.S. EPA CMOP General - 1	Coal Science: General - 1
12:00-13:30	Conference Luncheon - Ballroom					
	Session 7	Session 8	Session 9	Session 10	Session 11	Session 12
13:30-15:10	Clean Coal Demonstration and Commercial Projects: Combustion Projects	Coal Mining: Environmental Technologies for Mining	Gasification Technologies: General - 1	Combustion Technologies: Mercury Removal	U.S. EPA CMOP General - 2	Coal Science: Rare Earth Elements - 1
15:10-15:25	Coffee Break					
	Session 13	Session 14	Session 15	Session 16	Session 17	Session 18
15:25-17:05	Clean Coal Demonstration and Commercial Projects: Industrial Processes	Coal Mining: Gas Management in Mining Operations	Gasification Technologies: General - 2	Combustion Technologies: Oxy Combustion- 1	U.S. EPA CMOP General - 3	Coal Science: Rare Earth Elements - 2
18:00-21:00	Gateway Clipper Dinner Cruise					
Wednesday, October 7, 2015						
7:00-17:00	Registration – Room 306					
8:20-10:05	Plenary Session – Ballroom					
10:05-10:20	Coffee Break					
ROOM	301	302	303	304	305	310/311
	Session 19	Session 20	Session 21	Session 22	Session 23	Session 24
10:20-12:00	Clean Coal Demonstration and Commercial Projects: Gasification and Combustion	Coal Mining: Geological Characterization and Ground Control	Gasification Technologies: Biomass Co-Gasification	Combustion Technologies: Oxy Combustion- 2	U.S. EPA CMOP General - 4	Coal Science: General - 2
12:00-13:30	Conference Luncheon - Ballroom					
	Session 25	Session 26	Session 27	Session 28	Session 29	Session 30
13:30-15:10	Clean Coal Demonstration and Commercial Projects: Clean Coal and CBTL	Coal Mining: Mining Technology	Gasification Technologies: Modeling - 1	Combustion Technologies: Co-Firing	U.S. EPA CMOP General - 5	Coal Science: General - 3
15:10-15:25	Coffee Break					
	Session 31	Session 32	Session 33	Session 34	Session 35	Session 36
15:25-17:05	Sustainability and Environment: General - 1	Carbon Management: Post Combustion Capture	Gasification Technologies: General - 3	Combustion Technologies: General	U.S. EPA CMOP General - 6	Coal Science: General - 4
18:00-21:00	Poster Session - East Atrium					
Thursday, October 8, 2015						
7:00-17:00	Registration – Room 306					
8:20-10:05	Plenary Session – Ballroom					
10:05-10:20	Coffee Break					
ROOM	301	302	303	304	305	310/311
	Session 37	Session 38	Session 39	Session 40	Session 41	Session 42
10:20-12:00	Gasification Technologies: Bio-Conversion	Carbon Management: CO ₂ Storage	Gasification Technologies: General - 4	Shale and Coal Bed Gas: General - 1	Coal Science: General - 5	Coal Science: General - 6
12:00-13:30	Awards Luncheon - Ballroom					
	Session 43	Session 44	Session 45	Session 46	Session 47	Session 48
13:30-15:10	Clean Coal and Gas to Fuels - 1	Carbon Management: Conversions, Post Utilization or Heat Recovery	Gasification Technologies: Slag Analysis	Shale and Coal Bed Gas: General - 2	Coal Science: General - 7	Coal Science: General - 8
15:10-15:25	Coffee Break					
	Session 49	Session 50	Session 51	Session 52	Session 53	Session 54
15:25-17:05	Clean Coal and Gas to Fuels - 2	Carbon Management: Other Topics on CO ₂ Capture	Gasification Technologies: Modeling - 2	Shale and Coal Bed Gas: General - 3	Coal Science: General - 9	Coal Science: General - 10
18:00-20:00	Advisory Board Meeting					

The David L. Lawrence Convention Center



Registration
Room 306

Monday Evening Reception
Rooftop Terrace

Opening Ceremony
Spirit of Pittsburgh Ballroom

Plenary Sessions
Spirit of Pittsburgh Ballroom

Conference Luncheons
Spirit of Pittsburgh Ballroom

Poster Presentations
East Atrium

Exhibits
Ballroom Gallery

A/V & Speaker Preparation Room
Room 307

SESSION MEETING ROOMS

Room 301
Sessions 1, 7, 13, 19, 25,
31, 37, 43, 49

Room 302
Sessions 2, 8, 14, 20, 26,
32, 38, 44, 50

Room 303
Sessions 3, 9, 15, 21, 27,
33, 39, 45, 51

Room 304
Sessions 4, 10, 16, 22, 28,
34, 40, 46, 52

Room 305
Sessions 5, 11, 17, 23, 29,
35, 41, 47, 53

Room 310/311
Sessions 6, 12, 18, 24, 30,
36, 42, 48, 54

ORAL SESSIONS

Tuesday, October 6, 2015

SESSION 1
CLEAN COAL DEMONSTRATION
AND COMMERCIAL PROJECTS: DOE
DEMONSTRATIONS OVERVIEW, FINANCIAL
CONSIDERATIONS & POLYGENERATION WITH
EOR
Jason Lewis and Marty Weblor

Overview & Status Update of U.S. DOE Major Fossil Energy Carbon Capture & Geologic Storage Demonstration Projects, Thomas A. Sarkus, Nelson F. Rekos, Michael Knaggs, DOE/NETL, USA

Considered Insights into Successful Financings of Clean Coal Demonstration and Commercial Projects with Governmental Financial Incentives, Martin Weblor, DOE/NETL, USA

Financing Innovative Advanced Fossil Technology Deployment through the Title XVII Program, Andreas Marcotty, DOE/NETL, USA

Texas Clean Energy Project Update, Karl E Mattes, Summit Power Group, USA

Clean Coal Power Initiative Update: Texas Clean Energy Project, 400 MW Integrated Gasification Combined Cycle Poly-Generation with 90 Percent Carbon Capture, Jason Lewis, DOE/NETL, USA

SESSION 2
COAL MINING:
OPTIMIZATION OF MINING OPERATIONS
Aaron Noble and Richard Bajura

Industrial Engineering and Productivity Management in Coal Mining and Utilization: A Study with Special Reference to India, Venkata Satya, Surya Narayana, Rao Kambhampati, National Institute of Industrial Engineering, INDIA

Indonesian Coal Production Forecasting Using Logistic Curve: Evaluation Based on Coal Basin, Fadhila A Rosyid, Tsuyoshi Adachi, Akita University, JAPAN

SESSION 3
GASIFICATION TECHNOLOGIES:
ADVANCED TECHNOLOGIES
Massood Ramezan and Daniel Roberts

Feasibility Analysis of Combined IGCC and Syngas Chemical Looping for Power Generation, James C. Fisher, DOE/NETL; John E. Plunkett, Noblis, Inc., USA

Optimization of a Novel CO Conversion Quench Reactor, Philip Roessger, Konrad Uebel, Bernd Meyer, Institute of Process Engineering and Chemical Engineering, GERMANY

SESSION 4
COMBUSTION TECHNOLOGIES : FLUE GAS
CLEANUP
Evan Granite and Miki Shimogori

Pulsed Electron Beams Removal of NO_x and SO_x From Flue Gas, Matthew F. Wolford, John D. Sethian, Matthew C. Myers, Frank Hegeler, John Giuliani, Tzvetelina B. Petrova, Brian T. Fisher, H. Douglas Ladouceur, Naval Research Laboratory, USA

Specification of NO_x Emissions From Combustion of Lignites in a BFBC, Jan Hrdlicka, Pavel Skopec, Jan Opatril, Czech Technical University in Prague, CZECH REPUBLIC

Removal of Fine Particles from Flue Gas by Heterogeneous Condensation in WFGD System, Hao Wu, Danping Pan, Yezheng Jiang, Linjun Yang, Southeast University, CHINA

SESSION 5
U.S. EPA'S COALBED METHANE OUTREACH
PROGRAM (CMOP) COAL MINE METHANE
CONFERENCE TRACK
GENERAL - 1
Felicia Ruiz and Steve Carpenter

California Cap-and-Trade Panel Session #1: California Air Resources Board Compliance Offset Program and Mine Methane Protocol, Michael Coté, Ruby Canyon Engineering, USA- **Introduction to the California Compliance Offset Program – The Role of Offset Project Registries**, Will Ferreti, Verified Carbon Standard (VCS), USA-**Introduction to the California Compliance Offset Program – Verifying Coal Mine Methane Projects**, Michael Carim, First Environment, USA

The U.S. Climate Action Plan: Strategy to Reduce Methane Emissions – Approach for the Coal Mines Sector, Pamela Franklin, Environmental Protection Agency, USA

SESSION 6
COAL SCIENCE:
GENERAL - 1
Jim Hower and Frans Waanders

De-Sulfurization of Some Brazilian Power-Coals by Low Energy Ultrasonication, Matheus S. Civeira, Luis F.O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North-West University, SOUTH AFRICA; Binoy K. Saikia, CSIR-North East Institute of Science & Technology, INDIA

Briquetting of Non- and Poor-Baking Hard Coals for its Usage in Smelting Reduction Processes under Consideration of Blending and Curing Effects, Reinhard Lohmeier, Hans-Werner Schröder, Jens-Uwe Repke, TU Bergakademie Freiberg, GERMANY; Hado Heckmann, Primetals Technologies Austria GmbH, AUSTRIA

Manufacturing of Briquettes from Typical Highveld Coal Fines Using Various Binders, Frans Waanders, Nthabiseng Modiri, John Bunt, Hein Neomagus, North-West University, SOUTH AFRICA

The Influence of Lignin Sulfonate as a Binder for Fine Coal Pellets, Christien A Strydom, T.S. Mthombo, J.R. Bunt, North-West University, SOUTH AFRICA

SESSION 7
CLEAN COAL DEMONSTRATION
AND COMMERCIAL PROJECTS: CCS
PROCESSES: PRE-COMBUSTION, POST-
COMBUSTION & OXY-COMBUSTION
Diane Madden and Ted McMahon

Polish Way of Managing Coal-Based Energy Sector alongside EU Policy, Jan Antończyk, ENERGOPROJEKT-KATOWICE SA and AGH University of Science and Technology, POLAND

Update on the Kemper County IGCC Project, Diane Revay Madden, DOE/NETL; Tim Pinkston, Southern Company, USA

Petra Nova Carbon Capture & Sequestration Project Construction Update, Ted McMahon, DOE/NETL; Tony Armprister, USA

Pre-, Post- and Oxy-Combustion Approaches to Mitigate CO₂ Emissions: Techno-Economic Comparison, Giorgio Cucca, Francesca Ferrara, Alberto Pettinau, Sotacarbo S.p.A.; Giorgio Cau, Vittorio Tola, University of Cagliari, ITALY

Advanced Supercritical Coal Generation with Carbon Capture & Storage: Location Comparisons in the Eastern Interconnect, Joel Theis, DOE/NETL, USA

SESSION 8
COAL MINING: ENVIRONMENTAL
TECHNOLOGIES FOR MINING
Aaron Noble and Richard Bajura

International Standards Development Under ISO TC-82 Mining with a Focus on Equipment, Safety, Mine Reclamation, & Reserve Estimation, Steven M Carpenter, Advanced Resources International, Inc., USA

An Analysis of Scientific Investigations Related to Reclamation of Coal Mines with Coal Combustion By-Products, Kimery C. Vories, E-Ternion: Energy, Environment & Economy, USA

SESSION 9
GASIFICATION TECHNOLOGIES:
GENERAL - 1
Daniel Roberts and Joshua Stanislawski

Pilot-Scale Demonstration of Advanced Hydrogen and CO₂ Separation Membrane Technology, Joshua J. Stanislawski, Scott G. Tolbert, Tyler J. Curran, Michael L. Swanson, Energy & Environmental Research Center, University of North Dakota, USA

Technologies to Mitigate Syngas Cooler Plugging and Fouling, Mike Bockelie, Kevin Davis, Rand Pummill, Martin Denison, Tim Shurtz, Reaction Engineering International; Kevin Whitty, Mustafa Can Celebi, Andrew Fry, Cristina Jaramillo, Zhonghua Zhan, University of Utah; Jost Wendt, Reaction Engineering International and University of Utah, USA

Aspects of Chemical Quenching of Raw Gas from Entrained Flow Gasification, Patrick Fertl, Rainer Reimert, Karlsruhe Institute of Technology, GERMANY

Microwave-Assisted Steam Gasification of Low Rank Sub-Bituminous Coal, Victor Abdelsayed, Richard Bergen, DOE/NETL/AECOM; Dushyant Shekhawat, DOE/NETL, USA

Sub-Liquidus Rheology of Coal Slags Under Gasification Conditions, Sören Seebold, Guixuan Wu, Michael Müller, Institute of Energy and Climate Research(IEK-2), Forschungszentrum Jülich, GERMANY

SESSION 10
COMBUSTION TECHNOLOGIES: MERCURY
REMOVAL
Evan Granite and Miki Shimogori

Measurements of Fly Ash Optical Properties and the Effects of Powdered Activated Carbon Addition, Herek L. Clack, Tian Xia, James C. Hower, University of Kentucky, USA

Dry Sorbent Injection with Hydrated Lime for Acid Gas Control to Achieve Regulatory Compliance While Burning Various Coals, Gerald Hunt, Lhoist North America, USA

Startup Lessons Learned from Dry Sorbent Injection and Activated Carbon Injection Systems, David Park, S. Glesmann, ADA Carbon Solutions; R. Chang, EPRI; M. Lund, Nol-Tec Systems, USA

**SESSION 14
COAL MINING: GAS MANAGEMENT IN
MINING OPERATIONS**
Aaron Noble and Richard Bajura

Theory and Modelling of Explosion Scenarios in Coal Mines, Sinan Demir, Hayri Sezer, V'yacheslav Akkerman, West Virginia University; Ali S. Rangwala, Worcester Polytechnic Institute, USA

**SESSION 17
U.S. EPA'S COALBED METHANE OUTREACH
PROGRAM (CMOP) COAL MINE METHANE
CONFERENCE TRACK
GENERAL - 3**
Felicia Ruiz and Steve Carpenter

Market for Carbon Offsets – Trading, Risks and the Current State of Play, John Battaglia, Evolution Markets, Inc., USA

**SESSION 11
U.S. EPA'S COALBED METHANE OUTREACH
PROGRAM (CMOP) COAL MINE METHANE
CONFERENCE TRACK
GENERAL - 2**
Felicia Ruiz and Steve Carpenter

CMM Development in the U.S. – Where are the Sweet Spots?, James S. Marshall, Candice L. M. Tellio, Raymond C. Pilcher, Raven Ridge Resources Incorporated, USA

Modelling of Gas and Ventilation Flow Characteristics at an Underground In-Seam Drilling Site, Ting Ren, Zhongwei Wang, Jian Zhang, Frank Hungerford, University of Wollongong and Valley Longwall International Pty Ltd; Yuanping Cheng, China University of Mining and Technology, CHINA

Legal and Regulatory Developments Impacting Mine Methane Emissions and Projects in the U.S., Collon Kennedy, Attorney at Law, USA

Where's the VAM Abatement Project Opportunity in the U.S.?, Michael M. Cote, Ronald C. Collings, Ruby Canyon Engineering, USA

**SESSION 15
GASIFICATION TECHNOLOGIES:
GENERAL - 2**
Massood Ramezan and James Fisher

Pilot Scale Studies on CO₂-Enhanced Coal Gasification in a Circulating Fluidized Bed Reactor, Grzegorz Tomaszewicz, Andrzej Czaplicki, Aleksander Sobolewski, Tomasz Chmielniak, Marek Sciazko, Krzysztof Slowik, Institute for Chemical Processing of Coal, POLAND

**SESSION 18
COAL SCIENCE:
RARE EARTH ELEMENTS -2**
Jim Hower and Alan Kolker

Deep Eutectic Solvents and Ionic Liquids for Extraction of Rare Earth Elements from Coal Ash, Elliot Roth, Evan Granite, DOE/NETL; Megan K. Macala, Tracy Bank, AECOM, USA

California Cap-and-Trade Panel Session #2: Coal Mine Methane Projects, Carbon Offsets, and their Role in California Cap-and-Trade, Teresa Lang, Derik Broekhoff, Max DuBuisson, Climate Action Reserve, USA

**SESSION 12
COAL SCIENCE:
RARE EARTH ELEMENTS -1**
Jim Hower and Alan Kolker

Uncertainties and Optimum Detection Modes for Rare Earth Analysis in Coal and Coal Ash using Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Elliot Roth, Evan Granite, DOE/NETL; Tracy Bank, AECOM, USA

Kinetic Studies for CO₂ Gasification of HOK Cokes Using Thermogravimetric Analyzers at High Pressures, Ziad Abosteif, Stefan Guhl, TU Bergakademie Freiberg, GERMANY

Contribution of the Rare Earth-Rich Tonstein to the Chemistry of Fire Clay (Eastern Kentucky) Coal-Derived Fly Ash, James C. Hower, John G. Groppo, Rick Q. Honaker, Cortland Eble, Kentucky Geological Survey, USA

Analytical Approaches for Determining REE in Coal and Coal Ash, Allan Kolker, Clint Scott, Nick Geboy, Ruth Wolf, Jamie McCord, U.S. Geological Survey, USA

In-situ Analysis and Mechanism Study of Char-Ash/Slag Transition in Pulverized Coal Gasification, Lu Ding, Guangsuo Yu, East China University of Science and Technology, CHINA

Rare Earth Occurrences in Coal and their Association with Tonsteins, Diapirs, and Igneous Activity, H.T.Andersen, Digitus International; Rex Bryan, Thomas Gray, Dave Richers, Tetra Tech, Inc., USA

Synthesis of Layered Double Hydroxides Intercalated with Chelating Agents for Rare Earth Element Capture from Aqueous Streams, Ashley LeDonne, Elliot Roth, Evan Granite, DOE/NETL; Jonathan Lekse, AECOM, USA

**SESSION 16
COMBUSTION TECHNOLOGIES: OXY-
COMBUSTION -1**
Evan Granite and Miki Shimogori

Chemical Looping Combustion by Using Iron-Based Oxygen Carrier in Moving Bed Reactor System for Hydrogen Generation, Ping-Chin Chiu, Chien-Hua Chen, Cheng-Hsien Shen, Jieh-Yn Sheu, Kuo-En Huang, Industrial Technology Research Institute, TAIWAN

Characterization of Rare Earth Elements in Canadian Oil Sand Process Streams, Elliot Roth, Evan Granite, DOE/NETL; Tracy Bank, AECOM, USA

Leaching of Uranium from Coal Using Samples from the Springbok Flats Coalfield: Acid Leaching, Malumbazo Nandi, M. Ndhlalose, Council for Geoscience; N. J. Wagner, University of Johannesburg, SOUTH AFRICA

**SESSION 13
CLEAN COAL DEMONSTRATION AND
COMMERCIAL PROJECTS : INDUSTRIAL
PROCESSES**
Samuel Tam and Venkat Venkatraman

CO₂ Capture from Industrial Processes: Opportunities & Gaps, V Pradeep Indrakanti, William Bender, John Huston, Sr., Leonardo Technologies Inc.; John Litynski, U.S. Department of Energy, USA

Advanced Pressurized Oxy-Combustion: Towards Higher Plant Efficiency through Near-Zero Flue Gas Recycle and Boiler Designs, Adewale Adeosun, Fei Xia, Zhiwei Yang, Akshay Gopan, Benjamin M. Kumfer, Richard L. Axelbaum, Washington University in St Louis, USA

ORAL SESSIONS Wednesday, October 7, 2015

**SESSION 19
CLEAN COAL DEMONSTRATION AND
COMMERCIAL PROJECTS : COAL
GASIFICATION & COMBUSTION PROCESSES**
Nelson Rekos and Greg O'Neil

Application Progress of ECUST OMB Gasification Process, Guangsuo Yu, Zhijie Zhou, Xueli Chen, Zhenghua Dai, Yifei Wang, Haifeng Liu, Fuchen Wang, Xin Gong, East China University of Science and Technology, CHINA

Illinois Industrial Carbon Capture & Storage Project, Scott McDonald, Archer Daniels Midland Company, USA

A Standardized Method for the Characterization of Coal Ignition Under Oxyfuel Conditions, Martin Schiemann, Anna Becker, Sebastian Heuer, Nikita Vorobiev, Viktor Scherer, Ruhr-University; Daniel Haxter, Anna Havekost, Johannes Mayer, E.ON Technologies GmbH, GERMANY

China's 600 Mwe CFB Boiler - Some Issues in the Development and its Operation, Leming Cheng, Zhongyang Luo, Mengxiang Fang, Qinhui Wang, Mingjiang Ni, Kefa Cen, Zhejiang University; Li Nie, Qi Zhou, Dongfang Boiler Group Co. Ltd., CHINA

Port Arthur CCUS: Demonstration of CO₂ Capture & Sequestration of Steam Methane Reforming Process Gas Used for Large-Scale Hydrogen Production, Gloria Power, Nile R. Bolen, Air Products and Chemicals, Inc.; Anthony Zinn, DOE/NETL, USA

An Experimental and Numerical Study of Volatile Combustion of Single Coal Particles in an Oxygen Enriched Atmosphere, Jan Köser, Robert Knapstein, Lukas G. Becker, Benjamin Böhm, Johannes Janicka, Andreas Dreizler, Technische Universität Darmstadt, GERMANY

Advances in Flameless Oxy-Combustion Technology, Peter Reineck, ITEA S.p.a., UNITED KINGDOM; Massimo Malavasi, ITEA S.p.a., ITALY

Coal Combustion Characteristics in a 1MWth Pilot-scale Circulating Fluidized Bed under Oxy-fuel Conditions with High Oxygen Concentration, Haoyu Li, Shiyuan Li, Qiangqing Ren, Jingzhang Liu, Chinese Academy of Sciences, CHINA

CCS Flameless Pressurized Oxy-Combustion: Emphasis on "large scale pilot" facility, as the key step for process & equipment validation, before demo projects launching, and the new opportunity "ready for CCS" introduction, Massimo Malavasi, ITEA S.p.a., ITALY

Design of a Commercial-Scale Oxy-Coal Supercritical CO₂ Power Cycle, Nathan T. Weiland, Walter W. Shelton, DOE/NETL; Charles W. White, Noblis, Inc., USA

**SESSION 21
GASIFICATION TECHNOLOGIES:
BIOMASS CO-GASIFICATION**

Ting Wang and Jose Benitez

Synergy and Inhibition During Co-Gasification of Biomass-Coal Blends, Pradeep K. Agrawal, Gautami Newalkar, Carsten Sievers, Georgia Institute of Technology; Kristiina Iisa, National Renewable Energy Laboratory, USA

Poison Resistant Water-Gas-Shift Catalyst for Coal and Biomass Co-Gasification, Girish Srinivas, Steven C. Gebhard, Jeff Martin, Mike Looker, TDA Research Inc., USA

Techno-Economic Evaluation of a Low-Temperature CO₂ Capture Unit for IGCC Plants, Simon Roussanly, David Berstad, Rahul Anantharaman, Petter Nekså, Jana Jakobsen, SINTEF Energy Research, NORWAY

**SESSION 22
COMBUSTION TECHNOLOGIES: OXY-COMBUSTION - 2**

Allan Kolker and Solomon Nyathi

Emissions Control by Monitoring Total Excess Air and O₂, Dario DiMaggio, Kurz Instruments, Inc., USA

Investigation of Temperature Uniformity During High Oxygen Concentration Combustion in IMWT Circulating Fluidized Bed, Jingzhang Liu, Shiyuan Li, Qiangqiang Ren, Haoyu Li, Wei Li, Institute of Engineering Thermophysics, Chinese Academy of Sciences, CHINA

Examination of Changing Char Reactivity with Isothermal Oxy-Combustion Conversion by a Simplified Atomistic Simulation, Haihui Xin, Deming Wang, China University of Mining and Technology; Chang'an Wang, Xi'an Jiatong University, CHINA; Jonathan P. Mathews, Penn State, USA

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Felicia Ruiz and Steve Carpenter

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Coal Mine Methane Recovery Workplan, Steven E. Winberg, Battelle, USA

Coal Mine Methane Capture to Carbon Offsets Lessons Learned, Tom Vessels, Vessels Coal Gas, Inc., USA

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Allan Kolker and Solomon Nyathi

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Coke Quality Variation in Heat-Recovery Coke Making Oven, Mhlwazi Solomon Nyathi, Richard Kruse, ArcelorMittal USA; Maria Mastalerz, Indiana Geological Survey, USA

Mössbauer and Other Spectroscopic Analyses of North-East Indian Coals and Tailings Products, Frans Waanders, North-West University, SOUTH AFRICA; Binoy K Saikia, CSIR-North East Institute of Science & Technology, INDIA

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John Rockey and Anthony Zinn

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James Fisher and Ting Wang

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Low Cost, High-H₂ Syngas Production for Power, Hydrogen, and Liquid Fuels, Wei Yan, Arunabha Basu, Joseph Masin, S. James Zhou, Razima Souleimanova, Timothy Tamale, Naomi Klinghoffer, Howard S. Meyer, Gas Technology Institute, USA

Development and Application of a New Structure Based Viscosity Model for Oxide Melts Relevant to Fuel Slags, Guixuan Wu, Sören Seebold, Elena Yazhenskikh, Michael Müller, Institute of Energy and Climate Research (IEK-2), Forschungszentrum Jülich GmbH; Klaus Hack, GTT Technologies, GERMANY

Performance Analysis of Power Generation and Synthetic Natural Gas (SNG) Production from Coal Gasification with Integrated versus Non-Integrated Configuration, Hsiu-Mei Chiu, Po-Chuang Chen, Yau-Pin Chyou, Institute of Nuclear Energy Research, Atomic Energy Council, TAIWAN; Ting Wang, University of New Orleans, USA

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Evan Granite and Miki Shimogori

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Preliminary Studies on Biomass Co-Firing Targeted to Demonstration in a Commercial Pulverized Coal Power Plant, Won Yang, Tefera Zelalem Tumsa, Seuk Cheun Choi, Korea Institute of Industrial Technology; Junho Oh, Changkook Ryu, Sungkyunkwan University; Ik Hwan Na, Nak Kyun Kim, Hankook Technology Co., SOUTH KOREA

**SESSION 29
U.S. EPA'S COALBED METHANE OUTREACH PROGRAM (CMOP) COAL MINE METHANE CONFERENCE TRACK GENERAL - 5**

Felicia Ruiz and Steve Carpenter

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Estimating VAM Concentration Based on Coal Tonnage Forecast and Ventilation Flow Rate, Dominique Kay, Guy Drouin, Biothermica Technologies, CANADA

Addressing the Technology and Standards Gaps for VAM Abatement in Australia, David Cork, Rod Peet, Corky's Sustainable Energy; Peter Yallamas, Aerison Pty Ltd, AUSTRALIA

COMET™ – A Versatile Economic Low Temperature Catalytic Solution For Ventilation Air Methane Abatement, Ian Mitchell, David Watson, Suzanne Ellis, Peter Hinde, Alec Miller, Johnson Matthey Davy Technologies Limited, USA

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Michael Trippi and Allan Kolker

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Frans Waanders and Roy Lieberman

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Gary Stiegel and Henry Pennline

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Membrane Properties Required for Post-Combustion CO₂ Capture at Coal-Fired Power Plants, Simon Roussanly, Rahul Anantharaman, Karl Lindqvist, Jana Jakobsen, SINTEF Energy Research, NORWAY; Haibo Zhai, Edward Rubin, Carnegie Mellon University, USA

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Massood Ramezan and Daniel Roberts

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Comparison of Simulating NGCC/IGCC Power Plants between Using Thermoflex and Aspen Plus, Henry A. Long, Ting Wang, Energy Conversion & Conservation Center, University of New Orleans, USA

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Evan Granite and Miki Shimogori

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Influence of Different Steam Concentration on Carbonation Reaction of the Carbide Slag, Zirui He, Yingjie Li, Shandong University, CHINA

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SESSION 35
U.S. EPA'S COALBED METHANE OUTREACH PROGRAM (CMOP) COAL MINE METHANE CONFERENCE TRACK

GENERAL - 6

Felicia Ruiz and Steve Carpenter

Preliminary Results of Coal Methane Resources Assessment in Mongolia, Ochirsukh Badarch, Mongolian Nature and Environment Consortium, MONGOLIA

Coal Mine Methane Projects in Southwest China: Opportunities and Barriers to Development, Raymond C. Pilcher, Candice L. M. Tellio, James S. Marshall, Boni Jiang, Raven Ridge Resources Incorporated, USA

VAM at Russian Coal Mines, Oleg V. Tailakov, Institute of Coal of SB RAS/KuzSTU; Peet M. Sööt, CMM Energy LLC, RUSSIA

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COAL SCIENCE: GENERAL - 4

Allan Kolker and Michael Trippi

Coal Mining Residues and Sulphide Oxidation by Fenton's Reaction, Adilson C. Dalmora, Luis F.O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North-West University, SOUTH AFRICA

The Influence of Drying Conditions on Processing Properties of Lignite, Albrecht Matthes, Hans-Werner Schröder, Jens-Uwe Repke, TU Bergakademie Freiberg; Bastian Lehmann, RWE Power AG, GERMANY

Coal Drying Characteristics in Fluidized Bed Dryer, Wonjae Lee, Dongmin Jang, Jaehoon Choi, POSCO, SOUTH KOREA

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Arun Bose and Steve Markovich

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HUMAXX MicGAS™ Coal Bio Refinery Techno-Economic Analysis for Deployment in Wyoming, Daman S. Walia, ARCTECH Inc., USA

Thermogravimetric Assessment of Coal, Biomass and Their Blends to Support Pilot-Scale Gasification Tests, Alberto Pettinau, Alessandro Orsini, Mauro Mureddu, Francesca Ferrara, Sotacarbo S.p.A, ITALY

Synthesis of Polymer Encapsulated Porous Kaolinite Proppant for Microbially Enhanced Coalbed Methane Recovery, Taylor D. Sparks, Kyu Bum Han, John Fuertez, John McLennan, University of Utah, USA

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Gary Stiegel and Henry Pennline

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Development of the First Internationally Accepted Standard for Geologic Storage of Carbon Dioxide Utilizing Enhanced Oil Recovery (EOR) Under the International Standards Organization (ISO) Technical Committee TC-265, Steven M Carpenter, Advanced Resources International, Inc., USA

Pressure Data and Interference Testing at the Citronelle SECARB Phase III Site, Alabama USA, Hunter Jonsson, George Koperna, Jr., Advanced Resources International, Inc.; Rob Trautz, EPRI; Barry Friefeld, Lawrence Berkeley National Laboratory, USA

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Daniel Roberts and Ting Wang

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Richard Winschel and Leslie Ruppert

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From Venting Skyward to Moving Forward: A Historical Perspective on the Regulation of Coal Bed Methane Development, Jon C. Beckman, Steptoe & Johnson PLLC, USA

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Frans Waanders and Greg O'Neil

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The Fixation Capabilities of Fly Ashes Formed in Spanish Facilities Compared to that in the Israeli Facilities, Roy Nir Lieberman, Oriol Font, Xavier Querol, Institute of Environmental Assessment and Water Research (ID/EA) Consejo Superior de Investigaciones Científicas (CSIC), SPAIN; Haim Cohen, Ariel University, ISRAEL

Recycling of Fly Ash in Construction Projects Using Modifiers for Trace Metal Attenuation, Matthew M. Bernacki, Cody W. Barnes, Brandon P. Goold, Kevin T. Fitzgerald, Gautham P. Das, Wentworth Institute of Technology, USA

Evaluation of Strength of Subgrade Treated with Fly Ash & Calcium Stearate, Devin Howe, Ryan Marshall, Michael Mooney, Gautham Das, Wentworth Institute of Technology, USA

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Vann Bush and Ting Wang

Advanced Process Intensification Approaches for Production of JP-8 Jet Fuel from Coal with High Productivity and Selectivity, Andrew Lucero, August Meng, Brittany Koob, Kelly Mastro, Kevin McCabe, Santosh Gangwal, Southern Research, USA

Conversion of Coal and Biomass to Liquid Hydrocarbons Using Molten Salt Gasification and a Hybrid Fischer Tropsch Catalyst, Lyman Frost, Joseph Hartvigsen, S. Elangovan, Jessica Elwell, Ceramatec; Paul Dimick, Hongyun Yang, IntraMicron, Inc.; Neil Camarta, Western Hydrogen, USA

Development of a One Barrel per Day Coal to Liquids Pilot Research Facility and the Lessons Learned, Andrew Placido, Rodney Andrews, Don Challman,

University of Kentucky – Center for Applied Energy Research, USA

Comparison of Iron-Based Fischer Tropsch Catalysts Prepared Using a Simple, Inexpensive, Solvent Deficient Preparation Method, William C. Schaffers, University of Wyoming; William Hecker, Morris Argyle, Brigham Young University; Kyle Brunner, Sasol North America, USA

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Gary Stiegel and Henry Pennline

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Advances on Carbon Dioxide (CO₂) Capture on Alkaline Ceramics and its Catalytic Conversion to Added Value Products, Heriberto Pfeiffer, Instituto de Investigaciones en Materiales, Universidad Nacional Autónoma de México, MEXICO

Assessment of the Use of CO₂ Injection for Heat Mining in Geothermal Reservoirs in Mexico, Carlos E. Romero, Chunjian Pan, Pavel Ramirez, Edward K. Levy, Lehigh University, USA; Alicia Aguilar Corona, Oscar Chávez, Carlos Rubio Maya, Universidad Michoacana de San Nicolás de Hidalgo, MEXICO

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Steve Markovich and Arun Bose

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Prediction of Slag Formation during a UCG Process, Christien A Strydom, Jackie Collins, Romanus Uwaoma, North West-University; Johan C van Dyk, African Carbon Energy, SOUTH AFRICA

Slagging Characteristics of Australian Brown Coal Ashes, Alexander Y. Ilyushechkin, Daniel G. Roberts, David J. Harris, CSIRO Energy Flagship, AUSTRALIA

Mechanism of Coal Char Gasification Derived from Chinese Western Lignite in Mixture CO₂ and H₂O, Chao Ye, Qinhuai Wang, Zhongyang Luo, Mengxiang Fang, Zhejiang University, CHINA

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Richard Winschel and Steve Carpenter

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Frans Waanders and Diane Madden

Mathematical Model of Lignite Devolatilization with Solid Heat Carrier, Fang-Zhou Li, Jie Feng, Wen-Ying Li, Taiyuan University of Technology, CHINA

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Leslie Ruppert and Anthony Zimm

High-Resolution Transmission Electron Microscopy and Time of Flight Secondary Ion Mass Spectrometry: An Initial Study of the Distribution of Hazardous Elements and Rare Earth Elements in Coal Combustion Product, Adilson C. Dalmora, Luis F.O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North-West University, SOUTH AFRICA

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Vann Bush and Omar Basha

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Direct Natural Gas-Fueled Hybrid Fuel Cell System for Producing Liquid Fuel and Power, U. (Balu) Balachandran, T. H. Lee, S. E. Dorris, D. J. Myers, T. R. Krause, Argonne National Laboratory; A. S. Hock, C. U. Segre, Illinois Institute of Technology; Argonne National Laboratory, USA

Syngas Generation Via Chemical Looping Dry Reforming, Amey More, Götz Vesper, University of Pittsburgh, USA

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Gary Stiegel and Henry Pennline

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Warm Gas Precombustion CO₂ Capture Using Hydrophobic Solvents, Nicholas Siefert, DOE/NETL and Carnegie Mellon University; Hunaid Nulwala, Carnegie Mellon University; Wei Shi, Fan Shi, Jeffrey Culp, URS/AECOM/DOE/NETL; Elliot Roth, Victor Kusuma, ORISE/DOE/NETL; David Hopkinson, DOE/NETL, USA

Li- and K- Doped Na₂ZrO₃ Sorbents for CO₂ Capture, Yuhua Duan, DOE/NETL, USA

Advanced Process Control of Bubbling Fluidized Bed Adsorber-Regenerator Processes for Efficient Transient Operation, Priyadarshi Mahapatra, Jinliang Ma, AECOM/National Energy Technology Laboratory; Debansu Bhattacharyya, Benjamin Omell, West Virginia University; Stephen E. Zitney, David Miller, DOE/NETL, USA

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Ting Wang and Masood Ramezan

Dynamic Simulation of Opposed Multi-Burner Coal-Water Slurry Gasification System, Zhenghua Dai, Junyu Yang, Chao Li, Qinfeng Liang, Guangsuo Yu, East China University of Science and Technology, CHINA

Optical Experimental Study on the Characteristics of Impinging Reaction Region in Opposed Multiburner Gasifier, Xudong Song, Yan Gong, Guangsuo Yu, Qinghua Guo, East China University of Science and Technology, CHINA

Numerical Analysis of the Particle Residence Time Distribution and Flow Characters of the Opposed Multi-Burner Gasifier, Chao Li, Zhenghua Dai, Guangsuo Yu, Jianliang Xu, Fuchen Wang, East China University of Science and Technology, CHINA

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Leslie Ruppert and Steve Carpenter

Chloride and Bromide in Waters Associated With Production of Shale Gas, Coal Bed Methane, and Coal in the Northern Appalachian Basin, Paul F. Ziemkiewicz, West Virginia University, USA

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Frans Waanders and Jim Hower

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Jim Hower and Felicia Peng

Analysis of Relationships of Optimal Design Parameters of Cavitation Venturi Tube and Pico-Nano Bubble Size Distributions and Process Parameters of Column Flotation of Coal, Felicia Peng, Yu Xiong, West Virginia University, USA

Determination of Coal Ash Emissivity and its Application to Ash Deposition Model for Coal-Fired Boilers, Miki Shimogori, Mitsubishi Hitachi Power Systems, LTD., JAPAN

POSTER SESSIONS
Wednesday, October 7, 2015

POSTER SESSION
GASIFICATION

Numerical Analyses of Coal Gasification in a Bubbling Fluidized-Bed Gasifier, Hsien-Chi Tsui, Yu-Der Lin, Tsung Leo Jiang, National Cheng Kung University; Po-Chuang Chen, Yau-Pin Chyou, Institute of Nuclear Energy Research, Atomic Energy Council, TAIWAN

Radical Reactors - Using Multiphase Models to Automate Optimal Gasifier Design, William A. Rogers, Jenny Tennant, DOE/NETL, USA

Catalytic Effect of Na_2CO_3 on CO_2 Gasification of Wyodak Coal, Lei Bai, Xin He, Tuo Tang, Deping Xu, Yonggang Wang, China University of Mining and Technology (Beijing), CHINA; Fan Zhang, National Institute of Clean-and-Low-Carbon Energy, CHINA; Maohong Fan, University of Wyoming, USA

POSTER SESSION
CLEAN COAL DEMONSTRATION AND
COMMERCIAL PROJECTS

Pulverized Fuel Production from Coal Slimes of Hema Kandilli Washing Plant under 0.5mm with Reichert Spiral, Gunduz Atesok, Mustafa Ozer, Firat Burat, Onur Guven, Huseyin Basturkcü, Istanbul Technical University, TURKEY

POSTER SESSION
COMBUSTION

A Study on Ash Deposit Characteristics for Biomass Co-Firing in a Pilot Scale Pulverized Coal Combustion System, Seuk Cheun Choi, Yeong Seok Jang, Taeyoung Chae, Jae Wook Lee, Won Yang, Korea Institute of Industrial Technology, SOUTH KOREA

Comparative Performance Evaluation of Oxy-Fuel Combustion at Elevated and Atmospheric Pressure through Process Simulation, Tae-Young Mun, Tefera Zelalem Tumsa, Uendo Lee, Won Yang, Korea Institute of Industrial Technology, SOUTH KOREA

Experimental Studies on Slagging and Fouling Characteristics during Zhundong Coal Combustion, Haidong Ma, Yungang Wang, Qinxin Zhao, Heng Chen, Xi'an Jiaotong University, CHINA

POSTER SESSION
CLEAN COAL AND GAS TO FUELS

Oligomerization Over Solid Phosphoric Acid: The Limitation of Reaction Mechanism for Carbon Chain Growth, Yaru Yan, Jichang Zhang, William A. Turmel, Jie Feng, Wenying Li, Taiyuan University of Technology, CHINA

The Prediction of Pyrolysis Products Distribution from Coal Molecular Structure, Lan Yi, Jie Feng, Yuhong Qin, Qun Yi, William A. Turmel, Wenying Li, Taiyuan University of Technology, CHINA

CFD Modeling of the Local Hydrodynamics in a Pilot-Scale SBCR, Omar Basha, Badie I. Morsi, University of Pittsburgh; Li Weng, Zhuowu Men, Yonglong Li, Cuiqing

Zhang, National Institute of Clean and Low-carbon Energy, CHINA

POSTER SESSION
CARBON MANAGEMENT

Synthesis and Characterization of Novel Immobilized Amine Sorbent Pellets Utilizing Fly Ash and Poly (Vinyl Chloride), Walter Christopher Wilfong, ORISE Postdoctoral Researcher / DOE/NETL; Yee Soong, McMahan L. Gray, DOE/NETL; Brian W. Kail, AECOM, USA

Co Oxidation and Subsequent CO_2 Capture on Alkaline Ceramics, Brenda Alcántar-Vázquez, Heriberto Pfeiffer, Instituto de Investigaciones en Materiales, Universidad Nacional Autónoma de México, MEXICO

POSTER SESSION
COAL SCIENCE

An Experimental Research on Desulfurization of Fine Coal of China Using an Enhanced Centrifugal Gravity Separator, Tao Youjun, Song Ao, Man Zhongpei, Zhu Xiangnan, China University of Mining & Technology, CHINA

A New Map of Metallurgical Coal of the United States with New Geochemical, Rheological, and Petrological Data, Michael H. Trippi, Leslie F. Ruppert, U.S. Geological Survey; Cortland F. Eble, Kentucky Geological Survey; James C. Hower, University of Kentucky Center for Applied Energy Research, USA

Study the Effect of Pretreatment and Cosolvent on Coal Swelling Ratio, Xiaohua Wang, Fuyao Zhang, Donghua Wang, Yonglin Chang, Xi'an University of Science and Technology, CHINA

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