



THIRTY - THIRD - ANNUAL  
INTERNATIONAL PITTSBURGH  
**COAL CONFERENCE**

University of Pittsburgh - Swanson School of Engineering

**PRELIMINARY PROGRAM**

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



August 8 - 12, 2016  
Cape Town, SOUTH AFRICA  
Cape Town International Convention Center



University of Pittsburgh  
Swanson School of Engineering



NORTH-WEST UNIVERSITY<sup>®</sup>  
YUNIBESITI YA BOKONE-BOPHIRIMA  
NOORDWES-UNIVERSITEIT



# GENERAL INFORMATION

## 2016 TECHNICAL TOURS

### Eskom Lethabo and Sasol Secunda Plant Bus Tour, Gauteng (Johannesburg)

**Date: Monday, August 8th, 2016**

**Time: 7:00 - 17:00**

**Maximum Participants: 40 (First-come-first-served  
basis)**

**Cost: R700.00 per person**

**Notes: Bus Commentary Tour only**

**Departs from: Garden Court Sandton Hotel**

Based in Secunda, South Africa, Secunda Synfuels Operations receives coal from five mines in Mpumalanga. After being crushed, the coal is blended to obtain an even quality distribution. Electricity is generated by both steam and gas and used to gasify the coal at a temperature of 1300 degrees C. This produces syngas from which two types of reactor - circulating fluidised bed and Sasol Advanced Synthol™ reactors - produce components for making synthetic fuels as well as a number of downstream chemicals. Gas water and tar oil streams emanating from the gasification process are refined to produce ammonia and various grades of coke respectively.

### Koeberg Power Plant, Cape Town

**Date: Monday, August 8th, 2016**

**Time: 7:30 - 13:00**

**Maximum Participants: 40 (First-come-first-served  
basis)**

**Cost: R350.00 per person**

**Notes: Protective clothing will be provided**

**Departs from: Cape Town International Convention  
Centre**

The Koeberg Visitors Centre boasts a state of the art auditorium and exhibition area, which entralls and enlightens thousands of visitors every year. Visitors are given the opportunity to discover first-hand how the power station works and the measures taken to protect the environment around the station. From the deck of the centre, visitors can enjoy a panoramic view of Table Mountain, Robben Island, and a fair stretch of pristine West Coast coastline. Closer to home, the two domes of the power station's reactor buildings are clearly visible. The adjacent turbine hall houses the largest turbines in the Southern Hemisphere.

## ACCOMMODATIONS

**Hotels offering conference attendee  
rates are:**

### **Westin Cape Town**

Convention Square, Lower Long St,  
Cape Town City Centre, Cape Town,  
8001

### **Southern Sun The Cullinan**

1 Cullinan Street, Cape Town Water-  
front, Cape Town, 8001

### **City Lodge Hotel Victoria and Alfred Waterfront**

Corner Dock and Alfred Roads,  
Cape Town, 8012

Please visit our website [www.pccpitt.org](http://www.pccpitt.org) to  
make a reservation.

## Vineyard Tour, Cape Town

**Date: Tuesday, August 9th, 2016**

**Time: 8:30 - 13:00**

**Maximum Participants: 40 (First-  
come-first-served basis)**

**Cost: R450.00 per person**

**Notes: Wine tasting and cheese  
platter included**

**Departs from: Cape Town  
International Convention Centre**

Nestled in the picturesque Stellenbosch Kloof valley, two centuries ago, this historic 1791 Cape Dutch Homestead was the "last outpost" on the road between Cape Town and Stellenbosch. With over nine generations of producing wines, their wines combine Old World finesse and New World abundant fruit. Wines range from magnificent reds to fruit-driven whites. Tour of the vineyard, with wine tasting and a cheese platter.

# GENERAL INFORMATION

## CONFERENCE OVERVIEW

### MONDAY, AUGUST 8, 2016

Technical Tour - Johannesburg	06:45 - 17:30
Technical Tour - Cape Town	07:15 - 13:00

### TUESDAY, AUGUST 9, 2016

Vineyard Tour, Cape Town	08:15 - 13:00
Registration	15:00 - 18:00
Welcome Cocktail Reception	17:30 - 19:30

### WEDNESDAY, AUGUST 10, 2016

Registration	07:00 - 15:30
Opening Session	08:30 - 08:45
Plenary Session – 1	08:45 - 10:30
Concurrent Tech. Sessions	10:50 - 12:30
Conference Lunch	12:30 - 13:30
Concurrent Tech. Sessions	13:30 - 17:10
Poster Session	17:30 - 19:30

### THURSDAY, AUGUST 11, 2016

Registration	07:00 - 15:30
Opening Session	08:30 - 08:45
Plenary Session – 2	08:45 - 10:30
Concurrent Tech. Sessions	10:50 - 12:30
Conference Lunch	12:30 - 13:30
Concurrent Tech. Sessions	13:30 - 17:10
Gala Dinner	18:30 - 21:30

### FRIDAY, AUGUST 12, 2016

Registration	07:00 - 10:00
Opening Session	08:30 - 08:45
Plenary Session – 3	08:45 - 10:00
Concurrent Tech. Sessions	10:20 - 12:00
Awards Lunch	12:30 - 13:30

## PLENARY SPEAKERS

### WEDNESDAY, AUGUST 10, 2016

**Dr. Grace M. Bochenek**

Director, National Energy Technology Laboratory,  
Department of Energy, USA

**“Defining the Future – The Imperative of  
Coal Research”**

**Mr. Wang Hongqiao**

Vice President

China National Coal Association, CHINA

**“Current Situation and Prospect of Coal Industry in  
China”**

**Mr. Robert Jeffrey**

Managing Director and Senior Economist  
Econometrix, SOUTH AFRICA

**“Energy and its Effect on Economic Growth - The Role  
of Coal and Gas in the Future Economic Environment”**

### THURSDAY, AUGUST 11, 2016

**Prof. Behdad Moghtaderi**

Head of Department of Chemical Engineering  
University of Newcastle, AUSTRALIA

**“A State-of-the-Art Report on Chemical Looping Based  
Low Emission Coal Technologies”**

**Dr. Xiangzeng Wang**

Senior Vice President

Shaanxi Yanchang Petroleum Group Company, CHINA

**“Cleaner Coal and Greener Oil Production: An  
Integrated CCUS Approach by the  
Yanchang Petroleum Group”**

**Mr. Paul de Mattos**

Managing Director, Clarke Energy, SOUTH AFRICA  
**“The Future of Electricity Production from Coal and  
Gas”**

### FRIDAY, AUGUST 12, 2016

**Dr. Satya P. Chauhan**

Senior Program Director

Battelle Columbus Operations, USA

**“Scale-Up of Battelle’s Direct Coal-To-Liquids (CTL)  
Process for Jet Fuel Using Biomass-Derived Solvents”**

**Mr. Johan Brand**

Managing Director, Africary, SOUTH AFRICA

**“Environment Coal, Energy, and CCS Potential in South  
Africa - A Review”**

# PRELIMINARY PROGRAM SCHEDULE

Monday, August 8, 2016						
6:45-17:30	Technical Tour – Eskom Lethabo and Sasol Secunda Plant Bus Tour, Gauteng (Johannesburg)					
7:15-13:00	Technical Tour – Koeberg Power Plant, Cape Town					
Tuesday, August 9, 2016						
8:15-13:00	Vineyard Tour, Cape Town					
15:00-18:00	Registration - Outside Ballroom					
17:30-19:30	Welcome Cocktail Reception - Clivia Conservatory & Jasminum Restaurant					
Wednesday, August 10, 2016						
7:00-15:30	Registration - Outside Ballroom					
8:30-8:45	Opening Session – West Ballroom					
8:45-10:30	Plenary Session – West Ballroom					
10:30-10:50	Morning Tea					
ROOM	Room 1.41	Room 1.42	Room 1.43	Room 1.44	Room 1.61	Room 1.62
	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
10:50-12:30	Clean Coal Demonstration and Commercial Projects - 1	Shale and Coal Bed Gas - 1	Carbon Management - 1	Coal Science - 1	Gasification Technologies: Gas Cleanup	Coal Mining and Beneficiation - 1
12:30-13:30	Conference Lunch - East Ballroom					
	Session 7	Session 8	Session 9	Session 10	Session 11	Session 12
13:30-15:10	Clean Coal Demonstration and Commercial Projects - 2	Shale and Coal Bed Gas - 2	Carbon Management - 2	Coal Science - 2	Gasification Technologies: UCG - 1	Coal Mining and Beneficiation - 2
15:10-15:30	Afternoon Tea					
	Session 13	Session 14	Session 15	Session 16	Session 17	Session 18
15:30-17:10	Clean Coal Demonstration and Commercial Projects - 3	Shale and Coal Bed Gas - 3	Carbon Management - 3	Coal Science - 3	Gasification Technologies: General - 1	Coal Mining and Beneficiation - 3
17:30-19:30	Poster Session with Wine Tasting - East Ballroom					
Thursday, August 11, 2016						
7:00-15:30	Registration - Outside Ballroom					
8:30-8:45	Opening Session – West Ballroom					
8:45-10:30	Plenary Session – West Ballroom					
10:30-10:50	Morning Tea					
ROOM	Room 1.41	Room 1.42	Room 1.43	Room 1.44	Room 1.61	Room 1.62
	Session 19	Session 20	Session 21	Session 22	Session 23	Session 24
10:50-12:30	Clean Coal and Gas to Fuels: Catalytic Study - 1	Combustion Technologies 1	Sustainability and Environment - 1	Coal Science - 4	Gasification Technologies: General - 2	Coal Mining and Beneficiation - 4
12:30-13:30	Conference Lunch - East Ballroom					
	Session 25	Session 26	Session 27	Session 28	Session 29	Session 30
13:30-15:10	Clean Coal and Gas to Fuels: New Technologies	Combustion Technologies - 2	Sustainability and Environment - 2	Coal Science - 5	Gasification Technologies: Modeling - 1	Gasification Technologies: UCG - 2
15:10-15:30	Afternoon Tea					
	Session 31	Session 32	Session 33	Session 34	Session 35	Session 36
15:30-17:10	Clean Coal and Gas to Fuels: Catalytic Study - 2	Combustion Technologies - 3	Sustainability and Environment - 3	Coal Science - 6	Gasification Technologies: General - 3	Gasification Technologies: General - 4
18:30-21:30	Gala Dinner - East Ballroom					
Friday, August 12, 2016						
7:00-10:00	Registration - Outside Ballroom					
8:30-8:45	Opening Session – West Ballroom					
8:45-10:00	Plenary Session – West Ballroom					
10:00-10:20	Morning Tea					
ROOM	Room 1.41	Room 1.42	Room 1.43	Room 1.44	Room 1.61	Room 1.62
	Session 37	Session 38	Session 39	Session 40	Session 41	Session 42
10:20-12:00	Clean Coal and Gas to Fuels: Processing	Combustion Technologies - 4	Coal Science - 8	Coal Science - 7	Gasification Technologies: Modeling - 2	Gasification Technologies: General - 5
12:30-13:30	Awards Luncheon - East Ballroom					
17:00-19:00	Advisory Board Meeting - Cullinan Hotel					



## ORAL SESSIONS Wednesday, August 10 10:50 - 17:10

### SESSION 1

#### CLEAN COAL DEMONSTRATION AND COMMERCIAL PROJECTS - 1

*John Bunt and Thomas Sarkus*

10:50 - **The Value of Fuel Flexible Circulating Fluidized Bed Technology**, Robert Giglio, Antonio Castilla Oliver, Amec Foster Wheeler, USA

11:10 - **Application Update of OMB CWS Gasification Process**, Guangsuo Yu, Qinghua Guo, Xueli Chen, Yifei Wang, Zhenghua Dai, Haifeng Liu, Fuchen Wang, Xin Gong, ECUST, CHINA

11:30 - **Ohio Valley University's Alternative Clean Energy Facility**, Marcus Wiley, TCG Global, LLC, USA

11:50 - **SES SGT Commercial & Operation Plant Updates**, Francis Lau, Synthesis Energy Systems, USA

12:10 - **The U.S. Department of Energy's Current Portfolio of Major Fossil Energy Demonstration Projects**, Thomas A. Sarkus, Diane Madden, Theodore J. McMahon, Anthony Zinn, Sai Gollakota, Venkat Venkataraman, Nelson Rekos, DOE/NETL, USA

### SESSION 2

#### SHALE AND COAL BED GAS - 1

*Nikki Wagner and Leslie Ruppert*

10:50 - **Status of Worldwide CMM and CBM Activity Including Sub-Saharan Africa**, Jonathan Kelafant, Advanced Resources International, Inc.; Felicia Ruiz, U.S. Environmental Protection Agency, USA

11:10 - **Consideration of a Possibility of Enhanced Coalbed Methane Recovery by Injecting Air Into Coal Seam**, Noritaka Shimatani, Yuichi Sugai, Kyuro Sasaki, Kyushu University, JAPAN

11:30 - **Exploring and Exploiting Biogenic Coalbed Methane Potential in Pakistan**, Rizwan Haider, University of the Punjab; Muhammad Afzal Ghauri, National Institute for Biotechnology & Genetic Engineering, PAKISTAN

### SESSION 3

#### CARBON MANAGEMENT - 1

*Está van Heerden and John Duddy*

10:50 - **Status of the Carbon Capture International Test Center Network**, Roxann Laird, Southern Company Services, USA

11:10 - **Status of Technology Development at the National Carbon Capture Center**, Roxann Laird, Southern Company Services, USA

11:30 - **Performing a Push-Pull Test in a Shallow Aquifer to Assess Impacts of CO<sub>2</sub> and Impurities Leakage on Freshwater Quality**, Stéphane Lafortune, Philippe Gombert, Zbigniew Pokryszka, INERIS, FRANCE; Maria del Camino Martin Torre, Universidad de Cantabria, SPAIN

11:50 - **Geological Carbon Sequestration and its Influence on Subsurface Microbial Diversity and Metabolic Carbon Cycling**, Mariana Erasmus, Está van Heerden, University of the Free State, SOUTH AFRICA; Tullis Onstott, Princeton University; Mary DeFlaun, Geosyntec Consultants; Tommy Phelps, University of Tennessee, USA

12:10 - **Strategies on Reducing the Demand Supply Gap of Coal for Indian Industries**, Pradeep K. Singh, Ashok K. Singh, CSIR-Central Institute of Mining and Fuel Research, INDIA

### SESSION 4 COAL SCIENCE - 1

*Frans Waanders and Daniel Roberts*

10:50 - **Physical and Chemical Characteristics of Coke by using Ash-Free Coal as Binder**, Gyeong-Min Kim, Kevin Yohanes Lisandy, Jin-Ho Kim, Chung-Hwan Jeon, Pusan National University, KOREA

11:10 - **The Influence of K<sub>2</sub>CO<sub>3</sub> on the Swelling and Caking Behavior of Large South African Coal Particles**, S. Coetzee, H.W.J.P. Neomagus, J.R. Bunt, North-West University, SOUTH AFRICA

11:30 - **Time of Flight Secondary Ion Mass Spectrometry and High-Resolution Transmission Electron Microscopy/Energy Dispersive Spectroscopy: A Study of the Distribution of Hazardous Elements in Coal Ashes**, Diego de Medeiros, Marcos L.S. Oliveira, Bianca D. Lima, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

11:50 - **Investigation of Solvent Crystallization Process of Anthracene**, Wenying Li, Xiaoxiao Ding, Cuiping Ye, Mingming Fan, Hai Mu, Jie Feng, Taiyuan University of Technology, CHINA

12:10 - **Pyrolysis Product Evaluation and Prediction From Coals of Different Rank**, Gustav Pretorius, J.R. Bunt, North-West University, SOUTH AFRICA; M. Gräbner, Air Liquide, GERMANY

### SESSION 5 GASIFICATION TECHNOLOGIES: GAS CLEANUP

*Shehzaad Kauchali and Francis Lau*

10:50 - **Improving Response Rates of Acid Gas Absorber Columns**, Chris Higman, Higman Consulting GmbH; Bernd Epple, Christian Heinze, TU Darmstadt, GERMANY; Jose Marasigan, EPRI, USA

11:10 - **Thermodynamic Possibilities and Constraints for the Regeneration of Spent Solid H<sub>2</sub>S Sorbents Based on Ce-, La-, and Zn-Oxides**, Karel Svoboda, Miloslav Hartman, Institute of Chemical Process Fundamentals of the CAS; Jindřich Leitner, Jiří Brynda, Sjarhei Skoblia, University of Chemistry and Technology Prague, CZECH REPUBLIC; Yau-Pin Chyou, Yi-Shun Chen, Institute of Nuclear Energy Research, TAIWAN

11:30 - **Regeneration Performance and Mechanism of Iron-Based Desulfurization Sorbent of Coal Gas Under Atmosphere with Sulfur Dioxide**, Ju Shangguan, Jia-Wei Kou, Hui-Ling Fan, Taiyuan University of Technology, CHINA

11:50 - **Synergetic Effect of Oxygen and Sulfur Dioxide on Regeneration of Iron-Based Desulfurization Sorbent**, Jia-Wei Kou, Ju Shangguan, Hui-Ling Fan, Taiyuan University of Technology, CHINA

### SESSION 6 COAL MINING AND BENEFICIATION - 1

*Tarunjit Butalia*

10:50 - **The Product Yield Problem and the History and Future of Washability Analysis**, Herman Dorland, Nicola Wagner, Xitshembiso Makukule, University of Johannesburg, SOUTH AFRICA

11:10 - **Estimation of Moisture Dynamics within a Composite Coal Stockpile**, Kyle Enslin, Chris van Alphen,

Eskom; Walter Schmitz, University of Witwatersrand, SOUTH AFRICA

11:30 - **Reduction of Sulphur of a High Sulphur Rom Coal From Marki Mangli Mine, Wardha Valley Coalfield, Central India by the Wet Beneficiation Method**, S.P. Singh, A.L.V. Prasad, R. K Acharya, R. L. Katley, P.K. Chayande, D.K. Sakhre, CSIR-Central Institute of Mining & Fuel Research, INDIA

11:50 - **Issues on Coal Quality and its Upgradation Strategies for Indian Power Plants**, Ashok K. Singh, Pradeep K Singh, Priya Kumari, CSIR-Central Institute of Mining and Fuel Research, INDIA

12:10 - **Dry Coal Beneficiation of Finer Size Coal Using KAT Process**, Jambal Davaasuren, Korea University of Science and Technology (UST); Byoung-Gon Kim, Ho-Seok Jeon, Korea Institute of Geoscience & Mineral Resources, KOREA

### SESSION 7 CLEAN COAL DEMONSTRATION AND COMMERCIAL PROJECTS - 2

*John Bunt and Thomas Sarkus*

13:30 - **The Future of Coal**, Farid A. Malik, Forman Christian College (American University), PAKISTAN

13:50 - **Status Update on the Kemper County IGCC Project**, Diane Revay Madden, DOE/NETL; Tim Pinkston, Southern Company, USA

14:10 - **ITEA CCS Flameless Pressurized Oxy-Combustion: The Strategic Role of Intermediate Scale (50 MWh) Demonstration Units, Tailored on Local Quality and Low Rank Coals in Each Major Geographic Area, to Mature Technology in View of Industrial Exploitation**, Massimo Malavasi, ITEA S.p.a., ITALY

14:30 - **Shenhua Coal Refining Technology Development**, Cliff Y. Guo, National Institute of Clean-and-low-carbon Energy, CHINA

### SESSION 8 SHALE AND COAL BED GAS - 2

*Frans Waanders and Leslie Ruppert*

13:30 - **The Role of the Residual Bitumen of Mature Lacustrine Shale to the Gas Storage Capacity: A Case Study of the Triassic Yanchang Shale, Ordos Basin, China**, Jianfa Chen, Feiran Chen, Zhenxue Jiang, Zhilong Huang, Guoheng Liu, Fengyang Xiong, China University of Petroleum, CHINA

13:50 - **Analyses of Adsorbed and Free Gas Production Using Methane Carbon Isotope Fractionation During Canister Desorption of Shale Gas**, Yong Ma, Ningning Zhong, China University of Petroleum, CHINA; Zhejun Pan, CSIRO Energy Flagship, AUSTRALIA

### SESSION 9 CARBON MANAGEMENT - 2

*Está van Heerden and John Duddy*

13:30 - **Acid Gas Control by Dry Sorbent Injection in Air and Oxy-Fuel Combustion**, Reinhold Spörl, Reyhane Youssefi, Jörg Maier, Günter Scheffknecht, Institute of Combustion and Power Plant Technology - IFK, University of Stuttgart, GERMANY

13:50 - **Estimating CO<sub>2</sub> Sorption Capacity from a Flue Gas on Three South African Coals Under Feeds of Supercritical Conditions: Laboratory Experimental Study**, Major Mabuza, Kasturie Premlall, Tshwane University of Technology, SOUTH AFRICA

# TECHNICAL PROGRAM

14:10 - **Introduction to the Wyoming Integrated Test Center**, Jason Begger, Wyoming Infrastructure Authority, USA

14:30 - **Adsorption Characteristics of Bituminous Coal Seams in Zonguldak Basin**, Olgun Esen, Samet Can Ozer, Abdullah Fisne, Istanbul Technical University, TURKEY

## SESSION 10 COAL SCIENCE - 2

*Nikki Wagner and Daniel Roberts*

13:30 - **Determination of Rare Earth Elements (REE's) in Coals and their Associated Ash Products from Selected Localities in South Africa**, Matiane R. Arnold, Nikki Wagner, University of Johannesburg, SOUTH AFRICA

13:50 - **Rare Earth Elements from Coal and Coal By-Products**, Mary Anne Alvin, DOE/NETL, USA

14:10 - **Multifaceted Nanominerals and Ultrafine Particles in Phosphogypsum: A By-Product of Coal Cleaning Rejects**, Felipe B. de Leão, Centro Universitário La Salle and Universidade Federal do Rio Grande do Sul; Silvio R. Taffarel, Bianca D. Lima, Luis F. O. Silva, Centro Universitário La Salle; Carlos H. Sampaio, Universidade Federal do Rio Grande do Sul, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

14:30 - **Geochemistry of Major, Trace and Rare Earth Elements From Coal Seams of Kamptee Coalfield, Central India**, Anil M Pophare, RTM Nagpur University; A.L.V. Prasad, CSIR-Central Institute of Mining & Fuel Research, INDIA

14:50 - **Briquetting of Disk-Pelletized Fine Coal**, Darrell Taulbee, Robert Hodgen, University of Kentucky Center for Applied Energy Research, USA

## SESSION 11 GASIFICATION TECHNOLOGIES: UCG - 1

*Shehzaad Kauchali and Francis Lau*

13:30 - **UCG – Unlocking Southern-Africa's Coal Potential: Update on the Africary's Theunissen Underground Coal Gasification (TUCG) Project in South-Africa**, JF Brand, JC van Dyk, Africary, SOUTH AFRICA

13:50 - **The Queensland Underground Coal Gasification Pilots 2008-2016 – Evidence Based Assessment and Lessons in Government and Public Relations**, Cliff Mallett, Carbon Energy Limited, AUSTRALIA

14:10 - **Leaching of Metals From Post-Underground Coal Gasification Cavity Residues**, Krzysztof Stańczyk, Aleksandra Strugała-Wilczek, Central Mining Institute, POLAND

14:30 - **Coupled Thermo-Chemical-Mechanical Modelling of Cavity Growth and Farfield Geomechanical Assessment in Underground Coal Gasification**, Sevket Durucan, Ana Korre, Epameinondas Andrianopoulos, Guangyao Si, Ji-Quan Shi, Royal School of Mines, Imperial College London; Sebastian Franzsen, Seamwell International Ltd., UNITED KINGDOM

14:50 - **The Potential of Acid Rock Drainage From the Underground Coal Gasification Pilot Plant in Majuba**, Lehlolonolo Mokhahlane, Wits University, SOUTH AFRICA

## SESSION 12 COAL MINING AND BENEFICIATION - 2

*Tarunjit Butalia and Christien Strydom*

13:50 - **Avdan Lignite Mine Open Pit Planning and Design Studies for Thermal Power Plant**, C. Atilla

Ozturk, Murat Ozkan, Mohammad Lashgari, Selamet Ercelebi, Istanbul Technical University, TURKEY

14:10 - **Modelling a Multi-Layer Coal Mine Deposit: A Case Study of Avdan Lignite Site in Denizli, Turkey**, Mohammad Lashgari, Murat Ozkan, C. Atilla Ozturk, Selamet Ercelebi, Istanbul Technical University; Mustafa Darici, Anadolu Mining Co., TURKEY

14:30 - **Mineral Matter in Coals From the Soutpansberg Coalfield, South Africa**, Maseda Mphaphuli, Nicola Jane Wagner, University of Johannesburg; John Sparrow, Coal of Africa Limited, SOUTH AFRICA

## SESSION 13 CLEAN COAL DEMONSTRATION AND COMMERCIAL PROJECTS - 3

*John Bunt and Thomas Sarkus*

15:30 - **Illinois Industrial Carbon Capture and Storage Project**, Scott McDonald, Archer Daniels Midland Company, USA

15:50 - **Process Optimization and Solvent Reclaiming Enhanced the Operation and Production of an Existing 800 Tonnes Per Day Plant Capturing CO<sub>2</sub> From Flue Gases of a Coal-Fired Power Plant**, Ahmed Aboudheir, Lionel Kambeitz, HTC Purenergy, CANADA

16:10 - **Optimization of an Existing 130 Tonnes Per Day Plant Capturing CO<sub>2</sub> From Flue Gases of a Coal-Fired Power Plant**, Ahmed Aboudheir, Lionel Kambeitz, HTC Purenergy, CANADA

## SESSION 14 SHALE AND COAL BED GAS - 3

*Daniel Roberts and Leslie Ruppert*

15:30 - **Anisotropic Permeability and its Relationship with Pore/Fracture Structure of Longmaxi Shales in the Upper Yangtze Region, China**, Ningning Zhong, Yong Ma, China University of Petroleum, CHINA

15:50 - **Determination of Well Geometry and Optimum Injection Pressure for CO<sub>2</sub> Sequestration and Additional Methane Recovery in Ranigunj Coalfield of India Bby Reservoir Simulation**, Arpita Roy, Pratik Dutta, Indian Institute of Engineering Science and Technology, INDIA

16:10 - **Concentration of Coal-Bed Methane by Solvent Process Simulation**, Jianwei Li, Huihui Xue, Feng Bai, Xi'an University of Science and Technology, CHINA

## SESSION 15 CARBON MANAGEMENT - 3

*Esta van Heerden and John Duddy*

15:30 - **Monolithic Amine-Grafted Sorbents for Post-Combustion CO<sub>2</sub> Capture**, Steven S. C. Chuang, Jie Yu, Long Zhang, Yuxin Zhai, Hailiang Jin, Sihan Wang, The University of Akron, USA

15:50 - **Mathematical Modeling of Adsorption Behaviour of SOD-ZMOF/Chitosan Adsorbent During Post-Combustion CO<sub>2</sub> Capture**, Kelvin Odafe Yoro, Muofhe Singo, Michael O. Daramola, Jean L. Mulopo, University of the Witwatersrand, SOUTH AFRICA

16:10 - **Synthesis of Chitosan-Impregnated SOD-Zeolite Metal Organic Frameworks (SOD-ZMOF) for CO<sub>2</sub> Capture: A Preliminary Investigation**, Muofhe Singo, Michael O. Daramola, University of the Witwatersrand, SOUTH AFRICA

16:30 - **Nanocomposite Architecture Hydroxy Sodalite/ $\alpha$ -Alumina Membrane for CO<sub>2</sub> Capture**, O. Oloye, Michael O. Daramola, University of the Witwatersrand, SOUTH AFRICA

## SESSION 16 COAL SCIENCE - 3

*Christien Strydom and Nikki Wagner*

15:30 - **Prediction of Spontaneous Combustion in Coal by Use of Thermogravimetry**, Zama Mthabela, Nicola J Wagner, Nthabiseng Maledi, University of Witwatersrand, SOUTH AFRICA

15:50 - **Mechanical and Thermal Characterization of Briquetted High Ash South African Coal Fines Using Low Density Polyethylene as the Binding Agent**, Thabo Mthombo, Christien Strydom, John Bunt, Hein Neomagus, North-West University, SOUTH AFRICA

16:10 - **Evaluation of a Domestic-Use Low-Smoke Fuel Produced via the Pyrolysis of Lump Coal**, LP Sumbane, John R Bunt, Hein WJP Neomagus, Stuart SJ Picketh, Thys Kuhn, North-West University, SOUTH AFRICA

16:30 - **Study on Pyrolysis Characteristics of a Bio-Coal Briquette**, Xin-fu He, Lei Yang, Hong-ju Wu, Ya-gang Zhang, An-ning Zhou, Xi'an University of Science & Technology, CHINA

16:50 - **Study on Shrinkage Mechanism of Large-Sized Briquette During Pyrolysis Process**, Qi Wang, Yongfa Zhang, Yaling Sun, Yuqiong Zhao, Taiyuan University of Technology, CHINA

## SESSION 17 GASIFICATION TECHNOLOGIES: GENERAL - 1

*Shehzaad Kauchali and Francis Lau*

15:30 - **Soot Gasification in Syngas Atmosphere**, G. Worringer, Linde AG - Engineering Division; R. Reimert, Karlsruhe Institute of Technology (KIT), GERMANY

15:50 - **Comparison Study on Gasification of Long-Flame Briquette Coal with CO<sub>2</sub> and H<sub>2</sub>O**, Lingmei Zhou, Mo Chu, Zhibing Chang, Fang Xu, Chengliang Hao, China University of Mining and Technology, CHINA

16:10 - **Experiments of Coal Partial Gasification on a Circulating Fluidized Bed**, Chao Ye, Qinhui Wang, Zhongyang Luo, Mengxiang Fang, State Key Laboratory of Clean Energy Utilization, Zhejiang University, CHINA

16:30 - **Catalytic Reduction Mechanism Investigation of K<sub>2</sub>CO<sub>3</sub> Modified Iron-Based Oxygen Carrier by Carbon**, Zhongliang Yu, Shunxuan Hu, Chunyu Li, Tao Liu, Xing Zhou, Yitian Fang, Jiantao Zhao, Institute of Coal Chemistry, CHINA

## SESSION 18 COAL MINING AND BENEFICIATION - 3

*Tarunjit Butalia*

15:30 - **Development of a Condition Monitoring Philosophy for a Pulverised Fuel Vertical Spindle Mill**, Andre Govender, Eskom; Walter Schmitz, Reshendren Naidoo, University of the Witwatersrand, SOUTH AFRICA

15:50 - **Measurement and Prediction of Coal Flow Rates in Pulverised Fuel Pipes**, Dheshan Naran, Bonny Nyangwa, Eskom; Walter Schmitz, University of Witwatersrand, SOUTH AFRICA

16:10 - **Indian Coal Mining and Future Strategies**, Bodapati Prasad, Vinod Kumar Sinha, Mayank Ahuja, CMPDIL, INDIA

16:30 - **Applications of Online Coal Analysers in South Africa**, Michael Edwards, Scantech International Pty Ltd, AUSTRALIA



## ORAL SESSIONS

### Thursday, August 11, 2016

#### 10:50 - 17:10

#### SESSION 19

#### CLEAN COAL AND GAS TO FUELS: CATALYTIC STUDY - 1

*Somayeh Farzad and Wenhua Li*

10:50 - **Fischer-Tropsch Synthesis in the Presence of Solvent Using Novel Carbon-Oxide Composite Supported Cobalt and Iron Catalysts**, Atsushi Ishihara, Yusuke Maejima, Hiroyuki Nasu, Tadanori Hashimoto, Mie University, JAPAN

11:10 - **Carbon from Pine Cones as a Support for High Temperature Fischer-Tropsch Synthesis**, Eric van Steen, Pierre Cilliers, Doreen Nabaho, Chelsea Tucker, University of Cape Town; Wanda Bout, Augustine Ofomaja, Elvera Viljoen, Vaal University of Technology, SOUTH AFRICA

11:30 - **Bifunctional Hydrocracking: Is the Well-Established 'Classical' Fluid Phase Diffusion Mechanism a Delusion?**, Walter Böhlinger, Peter Wynne, Roald Brosius, Stephen Roberts, Jack CQ Fletcher, University of Cape Town, SOUTH AFRICA

#### SESSION 20

#### COMBUSTION TECHNOLOGIES - 1

*Mohsen Alimandegari and Johan van Dyk*

10:50 - **CFD Simulation of an Industrial Wet Flue Gas Desulfurization Spray Tower: A Comprehensive Model with Special Attention Devoted to the Modeling of Absorption and Chemical Reactions**, Raymond Everson, Arif Arif, Hein W.J.P. Neomagus, Dawie Branken, North-West University, SOUTH AFRICA

11:10 - **Optimization of Coal and Combustion Air Distribution for 500 MW Tangential Coal-Fired Plant**, Kitae Kang, Korea Southern Power (KOSPO) CO., Ltd, KOREA

11:30 - **NLP/MINLP for Modeling and Optimization of Lignite Pyrolysis Process**, Wengying Li, Yi Huang, Qun Yi, Minhui Gong, Guosheng Wu, Taiyuan University of Technology, CHINA

11:50 - **Medium-Temperature Selective Catalytic Reduction of NO Over Fe/TiO<sub>2</sub> Prepared by F127-Template Method**, Xiaojin Han, Yulin Li, Yaoping Guo, Zhanggen Huang, State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Chinese Academy of Sciences, CHINA

#### SESSION 21

#### SUSTAINABILITY AND ENVIRONMENT - 1

*Frans Waanders and Joseph Bittinger*

10:50 - **Hazardous Particles from Coal Fires from Santa Catarina, South Brazil**, Diego de Medeiros, Marcos L.S. Oliveira, Fagner T.C. Sá, Silvio R. Taffarel, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

11:10 - **An Investigation on Incorporation of a Local Thermal Power Station Boiler Ash as a Raw Material in Clinker Manufacture**, Nonhlanhla G. Mguni, Marcia R. Nyika, Liberty L. Mguni, National University of Science and Technology, ZIMBABWE

11:30 - **Environmental and Economic Evaluation of the Production of Organic Platform Chemicals from Different Feedstocks**, Florian Keller, Christian Wolfersdorf, Bernd Meyer, IEC, TU Bergakademie

Freiberg; Lutz Schiffer, Saxon Academy of Sciences in Leipzig, GERMANY

11:50 - **Process Simulation and Assessment of Coke Oven Gas to Methanol Integrated with CO<sub>2</sub> Recycle**, Wenying Li, Minhui Gong, Qun Yi, Yi Huang, Jie Feng, Guosheng Wu, Taiyuan University of Technology, CHINA

#### SESSION 22

#### COAL SCIENCE - 4

*Christien Strydom and Leslie Ruppert*

10:50 - **Research of the Masking Effect of Surfactants on O-Containing Functional Groups in Low-Rank Coals**, Geng Jianchun, China University of Mining and Technology, CHINA

11:10 - **Study on the Residue Features of Ningdong Coal Entrained Flow Gasifier**, Shiyong Zhao, Yang Wu, Bo Li, Anning Zhou, Zhiyuan Yang, Xi'an University of Science and Technology, CHINA

11:30 - **Preparation and Capacitive Properties of Carbon Materials From Direct Coal Liquefaction Residue and Phenolic Resin**, Jiangtao Cai, Chen Chen, Shiqi Fu, Anning Zhou, Xi'an University of Science and Technology; Jieshan Qiu, Dalian University of Technology, CHINA

11:50 - **Fabrication of Silver Nano-Particles Functionalized Adsorbents for HgO Adsorption**, Chong Tian, Yongchun Zhao, Junying Zhang, Huazhong University of Science and Technology, CHINA

#### SESSION 23

#### GASIFICATION TECHNOLOGIES: GENERAL - 2

*Daniel Roberts and Aleksander Sobolewski*

10:50 - **Char Gasification Kinetics in Mixtures of CO<sub>2</sub> and H<sub>2</sub>O: Understanding the Roles of Active Sites and Catalysis**, Daniel Roberts, Mark Kochanek, David Harris, CSIRO, AUSTRALIA

11:10 - **Green Coal Development for Application in Fixed-Bed Catalytic Gasification**, John R Bunt, Sanette Marx, Frans B Waanders, North-West University, SOUTH AFRICA

11:30 - **Experimental Investigation on Char Gasification Kinetics at Elevated Pressures**, Sascha Russig, Victor Gonzalez, Mark Zink, Steffen Krzack, Stefan Guhl, Bernd Meyer, TU Bergakademie Freiberg, GERMANY

11:50 - **Ash Agglomeration in the Modified Internal Circulating COORVED Coal Gasifier**, Martin Schurz, Alexander Laugwitz, Steffen Krzack, Bernd Meyer, TU Bergakademie Freiberg, GERMANY

12:10 - **Particle Fragmentation Behavior in a Bench Scale Entrained-Flow Coal-Water Slurry Gasifier**, Qinghua Guo, Guangsuo Yu, Yifei Wang, Xin Gong, East China University of Science and Technology, CHINA

#### SESSION 24

#### COAL MINING AND BENEFICIATION - 4

*Nikki Wagner and Tarunjit Butalia*

10:50 - **Assessing Risks Related to Stimulation of Firedamp Drainage Boreholes in Order to Recommend Prevention Measures and Monitoring Methods to Help Early Risk Management During Design of Future Drainage Projects**, Stéphane Lafortune, Régis Farret, Candice Lagny, Zbigniew Pokryszka, INERIS, FRANCE

11:10 - **Gas Evolution and How it Relates to Setting Trigger Action Response Plans**, Tana Levi, Rod Brown, CRL Energy Ltd., NEW ZEALAND; Basil Beamish, CB3 Mine Services Pty Ltd., AUSTRALIA

11:30 - **Early Detection of Fire in Coal Mines Using Heat Spy Infra-Red Thermometer - Case Studies**, R.

V. K. Singh, N. K. Mohalik, J Pandey, R. K. Mishra, CSIR-Central Institute of Mining & Fuel Research, INDIA

11:50 - **Seal Design Investigations for Omerler Underground Coal Mine in Turkey**, C. Atilla Ozturk, Abdullah Fisne, Istanbul Technical University; Mustafa Ozdingis, Sahika Yurek, Kivanc Het, Turkish Coal Enterprises, TURKEY

12:10 - **Study of Coal Maceral on Different Ionic Collector in Flotation**, Shiyong Zhao, Bo Li, Yang Wu, Anning Zhou, Zhiyuan Yang, Xi'an University of Science and Technology, CHINA

#### SESSION 25

#### CLEAN COAL AND GAS TO FUELS: NEW TECHNOLOGIES

*Somayeh Farzad and Wenhua Li*

13:30 - **Supercritical CO<sub>2</sub> Cycles for Power Production**, Mike Holmes, Joshua Stanislawski, Jason Laumb, Energy & Environmental Research Center, University of North Dakota; Xijia Lu, Brock Forrest, Mike McGroddy, 8 Rivers Capital, LL, USA

13:50 - **Integration of Gasification and Fuel Cells: Interaction Between the Anode and Contaminants in the Syngas**, Marcos Millan, Esther Lorente, Paul Boldrin, Nigel Brandon, Imperial College, UNITED KINGDOM

14:10 - **Liquefaction of South African Bituminous Coal Using Phenol as a Solvent**, Zach Sehume, C.A. Strydom, J.R. Bunt, North-West University, SOUTH AFRICA; H.H. Schobert, Penn State University, USA

14:30 - **Effect of Direct Addition of Alcohols to an Oligomerisation Reaction System**, Mekia Makhubu, Klaus Moller, University of Cape Town; Masikana Mdeleleni, PetroSA Synthetic Fuels Innovation Center (PSFIC), University of Western Cape, SOUTH AFRICA

#### SESSION 26

#### COMBUSTION TECHNOLOGIES - 2

*Mohsen Alimandegari and Johan van Dyk*

13:30 - **Fuel Additive Efficient Coal Combustion Technology**, Marc Ottolini, International Innovative Technologies Ltd.; William Nimmo, Syed Sheraz Daood, University of Sheffield, UNITED KINGDOM

13:50 - **Removal of Vapor-Phase Elemental Mercury from Fuel Gas by Innovative ZnS Nanoparticles**, Hailong Li, Lei Zhu, Central South University; Yongchun Zhao, Junying Zhang, Huazhong University of Science and Technology; Kaimin Shih, The University of Hong Kong, CHINA

14:10 - **Impact of Biomass Co-Firing with Unreactive Coals in Pulverised Fuel**, C. Bridge, C. Snape, University of Nottingham; C. J. Waldron, GE Power, UNITED KINGDOM

14:30 - **Effects of Temperature on Physico-Chemical Characteristics Evolution of Rice Husk Char under Reburning Conditions**, Jiateng Shi, Xinyi Yin, Ping Lu, Nanjing Normal University, CHINA

#### SESSION 27

#### SUSTAINABILITY AND ENVIRONMENT - 2

*Frans Waanders and Joseph Bittinger*

13:30 - **Environmental Pollution and Nano-Mineralogical Characterization of Coal, Overburden and Sediment from Assam (India) Coal Mining Acid Drainage**, Frans B. Waanders, North West University, SOUTH AFRICA; Silvio R. Taffarel, Diego de Medeiros, Cesar M. N. L. Cutruneo, Luis F.O. Silva, Centro Universitário La Salle, BRAZIL; Madhulika Dutta, CNB College and CSIR-North East Institute of Science & Technology; Binoy K Saikia,

# TECHNICAL PROGRAM

CSIR-North East Institute of Science & Technology, INDIA

13:50 - **Bench-Scale Testing of Stabilized Flue Gas Desulfurization Materials to Treat Acid Mine Drainage**, Tarunjit S. Butalia, The Ohio State University, USA

14:10 - **Orbitrap Analysis of Fullerene on Surface Soils and River Sediments from Santa Catarina (Brazil) Coal Area**, Diego de Medeiros, Marcos L.S. Oliveira, Silvio R. Taffarel, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL

14:30 - **Fireside Corrosion Monitoring, Control and Prevention in a 600 MWe Pulverized Fuel Boiler**, Otilia Mwape, University of the Witwatersrand, SOUTH AFRICA

## SESSION 28 COAL SCIENCE - 5

*John Bunt and Leslie Ruppert*

13:30 - **Trace Elements Associated with the Upper Coal Zones of the Springbok Flats Basin, South Africa**, Valerie Nxumalo, Nicola Wagner, Jan Kramers, Clarisa Vorster, Bruce Cairncross, University of Johannesburg; John Paul Hunt, Council for Geoscience and University of Johannesburg; Wojciech Przybylowicz, iThemba LABS, SOUTH AFRICA

13:50 - **Organic and Inorganic Characterisation of Different Coals by Single Particle Analysis**, Sanja Potgieter-Vermaak, Manchester Metropolitan University and University of the Witwatersrand; Nthabiseng Maledi, Herman Potgieter, University of the Witwatersrand; Nicola Wagner, University of Johannesburg, SOUTH AFRICA; Robert Sparkes, Manchester Metropolitan University, UNITED KINGDOM

14:10 - **Coal Cleaning Rejects and Sulphide Oxidation by Fenton's Reaction**, Diego de Medeiros, Anderson S. Pires, Marcos L.S. Oliveira, Bianca D. Lima, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

14:30 - **Application of Spectro-Radiometry for Coal Quality and Lithological Differentiation-Case Studies From Damodar Valley Coalfields**, Ashok K. Singh, Pradeep K Singh, Prabal Boral, Priya Kumari, CSIR-Central Institute of Mining and Fuel Research, INDIA

14:50 - **Petroleum Coke-Based Activated Carbon Modified by Binary Metal Oxides for Elemental Mercury Removal in Flue Gas**, Yang Li, Ning Zhang, Lijun Jin, Haoquan Hu, Dalian University of Technology, CHINA

## SESSION 29 GASIFICATION TECHNOLOGIES: MODELING - 1

*Daniel Roberts and Aleksander Sobolewski*

13:30 - **Effect of Alkali Species in Australian Coals on Slag Composition and Viscosity**, Alexander Ilyushechkin, Daniel Roberts, David Harris, CSIRO, AUSTRALIA

13:50 - **Numerical Study of the Hitecom Reactor for In-Situ Measurement of Single Char Particle Conversion**, Fengbo An, Andreas Richter, Felix Küster, Stefan Guhl, Bernd Meyer, Technische Universität Bergakademie Freiberg, GERMANY

14:10 - **CFD-Based Accelerated Gasification Technology Development**, Andreas Richter, Philip Rößger, Thomas Förster, Peter Seifert, Bernd Meyer, TU Bergakademie Freiberg, GERMANY

14:30 - **Syngas-Based Annex Concepts and CO<sub>2</sub>-Based Power-To-X Concepts Within Pulverized Coal Combustion Power Plants**, Christian Wolfersdorf,

Clemens Forman, Bernd Meyer, IEC, TU Bergakademie Freiberg, GERMANY

## SESSION 30 GASIFICATION TECHNOLOGIES: UCG - 2

*Johan Brand and Thomas Sarkus*

13:30 - **Can UCG Give Coal a New Lease on Life in 21<sup>st</sup> Century?**, Michael S. Blinderman, Ergo Exergy Technologies Inc., CANADA; Simon S. Maev, Laurus Energy, Inc., USA

13:50 - **Life Cycle Sustainability Assessment of Integrated UCG-CCS Systems, Comparison with Clean Coal Alternatives**, Anna Korre, Sevket Durucan, Zhenggang Nie, Royal School of Mines, Imperial College London; Sebastian Franzsen, Seamwell International Ltd., UNITED KINGDOM

14:10 - **Ex-Situ Simulation of High Pressure Underground Gasification of Hard Coal and Lignite**, Krzysztof Stańczyk, Krzysztof Kapusta, Marian Wiatowski, Central Mining Institute, POLAND; Sevket Durucan, Imperial College London, UNITED KINGDOM

14:30 - **Experimental and Computational Studies on Underground Gasification of Turkish Lignite**, Mesut Gür, Nurdil Eskin, Hasancan Okutan, Ahmet Arisoy, Erhan Böke, Ünal Altıntaş, Oğuz Büyüksirin, E. Deniz Canbaz, Olgu Yıldırım, Istanbul Technical University, TURKEY

14:50 - **The CUMT International Research Centre for Underground Coal Gasification**, Cliff Mallett, Carbon Energy Limited, AUSTRALIA

## SESSION 31 CLEAN COAL AND GAS TO FUELS: CATALYTIC STUDY - 2

*Somayeh Farzad and Wenhua Li*

15:30 - **Spontaneously Activatable Iron-Based Catalysts in Fischer-Tropsch Synthesis: From Lab-Scale Study to Pilot-Scale Demonstration**, Dong Hyun Chun, Geun Bae Rhim, Ji Chan Park, Ho-Tae Lee, Jung-II Yang, Sungjun Hong, Heondo Jung, Heon Jung, Korea Institute of Energy Research, KOREA

15:50 - **Single Pass Fischer-Tropsch Synthesis Over Iron-Based Catalysts**, Eric van Steen, Michael Claeys, Klaus P. Möller, Doreen Nabaho, University of Cape Town, SOUTH AFRICA

16:10 - **Low-Temperature Methanation of Syngas in Slurry Reactor Over NiO@SiO<sub>2</sub> Core-Shell Catalyst**, Yizhuo Han, Junfeng Zhang, Hui Wang, Institute of Coal Chemistry, Chinese Academy of Sciences, CHINA

16:30 - **Effect of CO<sub>2</sub> Co-Feeding on the Conversion and Selectivity of Syngas Derived from Waste to Liquid Fuel Over a Bi-Functional CO-H-ZSM-5 Catalyst**, Khuthadzo Matamela, Michael Daramola, University of the Witwatersrand, SOUTH AFRICA

16:50 - **Catalyst Deactivation During Hydroprocessing of Coal-Derived Liquids at Pilot Plant Scale**, Rui Wang, Zhuihua Han, Linge Ma, Jingyun Chen, Xuelei Duan, Chenjing Qian, Yinhua Long, Xiaofen Guo, National Institute of Clean-and-Low-Carbon Energy, CHINA

## SESSION 32 COMBUSTION TECHNOLOGIES - 3

*Mohsen Alimandegari and Daniel Roberts*

15:30 - **Vapor Phase Chemical Looping Combustion of Coal**, Tomasz Wiltowski, Debalina Dasgupta, Kanchan Mondal, Quan Zhang, Southern Illinois University, USA

15:50 - **Copper-Based Chemical Looping with Oxygen Uncoupling: Process Development, Reactor Scale-Up, Pilot-Scale Studies and System Modeling**, Kevin J.

Whitty, Matthew A. Hamilton, Kirsten M. Merritt, Kyle O'Malley, Shakar Ali, Emir Rahislic, Andrew R. Fry, JoAnn S. Lighty, The University of Utah, USA

16:10 - **A Study on the Mineral Liberation and Transformations During Pulverised Bituminous Coal Combustion**, Laurence Silvester, Cheng-gong Sun, Colin Snape, Hao Liu, Ofonime Udoudo, University of Nottingham; William Livingston, Doosan Babcock Energy Limited, UNITED KINGDOM

16:30 - **Combustion Properties of Bamboo When Blended with a South African Coal**, O. Makwela, S O Bada, R Falcon, University of the Witwatersrand, SOUTH AFRICA

16:50 - **An Experimental Study of Nitrogen Oxides Formation of Pulverized Coal in O<sub>2</sub>/N<sub>2</sub> and O<sub>2</sub>/CO<sub>2</sub> Atmospheres**, Jeong-Woo Kim, Hong-Min Cho, Lim Ho, Chung-Hwan Jeon, KOREA

## SESSION 33 SUSTAINABILITY AND ENVIRONMENT - 3

*Frans Waanders and Joseph Bittinger*

15:30 - **American Electric Power's Experience with Mercury and Air Toxics Standards (MATS) Compliance**, Joseph E. Bittinger, Dean Bell, Jason Baker, Douglass Ritzenthaler, American Electric Power, USA

15:50 - **Future of Coal Utilization in the US and China**, Qingyun Sun, Richard Bajura, West Virginia University, USA; Min Zhou, Xianliang Meng, China University of Mining & Technology, CHINA

16:10 - **Carbon Tax in South Africa: Sustainability Challenges**, L. Landu, Council for Mineral Technology (MINTEK); R Minnitt, R Falcon, The University of the Witwatersrand, SOUTH AFRICA

16:30 - **Development of Principles of Carbon Dioxide Sequestration During the Underground Coal Gasification of Coal Seams in Permafrost**, Alexey Belov, A.V. Andreev, I.V. Grebenyuk, A.I. Babaev, Far Eastern Federal University, RUSSIA; N.N. Kinaev, Strategic Energy Consulting/FEFU, AUSTRALIA and RUSSIA

16:50 - **The Application of Coal Quality Database Over Time and Space Across the Mpumalanga Coalfields**, M. P. Kekana, N. J. Wagner, University of Johannesburg, SOUTH AFRICA

## SESSION 34 COAL SCIENCE - 6

*John Bunt and Leslie Ruppert*

15:30 - **Property of Extract Prepared by Hydrothermal Extraction of Brown Coal**, Masato Morimoto, Qingxin Zheng, Toshimasa Takanohashi, Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology, JAPAN

15:50 - **Process Characteristics Investigation of Shendong Coal Co-Pyrolysis through Solid Heat Carrier**, Wenying Li, Baofu Li, Xiaohong Li, Jie Feng, Taiyuan University of Technology, CHINA

16:10 - **The Prediction of Pyrolysis Products in Grading Lignite Pyrolysis Process**, Wenying Li, Lan Yi, Jie Feng, Yuhong Qin, Yuhong Qin, CHINA

16:30 - **Influence of Oxygen Group and Coal Structure on the Migration of Biomass Alkalis During Coal/Biomass Co-Pyrolysis**, Wengying Li, Rong Zhu, Yuncai Song, Laisong Wang, Jie Feng, Taiyuan University of Technology, CHINA

16:50 - **Heat Release Characteristics of the Oxidation of Aliphatic Hydrocarbon Groups and its Effects on the Spontaneous Combustion of Coal**, Tao Xu, Jianghong



# TECHNICAL PROGRAM

Liu, Jinhui Wang, Yu Jiao, Yutao Kang, Xiaobei Yin, Qimiao Xie, Xianbin Li, Shanghai Maritime University; Haihui Xin, Deming Wang, China University of Mining and Technology, CHINA

## SESSION 35

### GASIFICATION TECHNOLOGIES: GENERAL - 3

*Christien Strydom and Aleksander Sobolewski*

15:30 - **CO<sub>2</sub> and H<sub>2</sub>O Gasification Under Chemically and Diffusion Controlled Conditions**, Thobias Kreitzberg, Benjamin Gövert, Stefan Pielsticker, Reinhold Kneer, Institute of Heat & Mass Transfer (WSA), RWTH Aachen University, GERMANY

15:50 - **New Approach in Gasifying Reactive Low Rank Coals Under Non/Partial Slagging Entrained-Bed Conditions: 20 TPD Pilot Test Results**, Yongseung Yun, Jin-Wook Lee, Seok Woo Chung, Institute for Advanced Engineering; Young-Tai Choi, Korea Institute of Industrial Technology, KOREA

16:10 - **Influence of Quench Water Temperature and pH Value Variations on Selected Trace Components in Autothermal Gas Reforming Processes**, Ibrahim Kolawole Muritala, Technische Universität Bergakademie Freiberg, GERMANY

16:30 - **Influences of the Cross Angle on the Granular Jet in Annular Gas Stream with Thick Wall of Inner Channel**, Chenchen Fang, Haifeng Liu, East China University of Science and Technology, CHINA

## SESSION 36

### GASIFICATION TECHNOLOGIES: GENERAL - 4

*Johan Brand and Thomas Sarkus*

15:30 - **Kinetic Studies for CO<sub>2</sub> Gasification of HOK Cokes Using Thermogravimetric Analyzers at High Pressures**, Ziad Abosteif, Stefan Guhl, TU Bergakademie Freiberg, GERMANY

15:50 - **Study on the Effect of Particle Size on Gasification Characteristics of Different Ranked Chars Under High Temperature**, Xin Gong, XiaoPeng Zou, Haifeng Lu, Qinghua Guo, East China University of Science and Technology, CHINA

16:10 - **Experimental Study of Particle Evolution Characteristics at Different Region in an Opposed Multi-Burner Gasifier**, Qing Zhang, Yan Gong, Qinghua Guo, Guangsuo Yu, East China University of Science and Technology, CHINA

## ORAL SESSIONS

Friday, August 12, 2016

10:20 - 12:00

## SESSION 37

### CLEAN COAL AND GAS TO FUELS: PROCESSING

*Somayeh Farzad and Wenhua Li*

10:20 - **Methane Quality, Processing and Hydrogen Production**, Klaus Rademann, Thomas Ryll, Humboldt-Universität zu Berlin, GERMANY

10:40 - **The Development of Highly Anisotropic Coke from an Aliphatic Fischer-Tropsch Waxy Oil Residue**, JG Clark, Sasol Performance Chemicals, SOUTH AFRICA

11:00 - **The Conversion of FT Olefins: Multiphase Reactor Simulation Study**, Klaus Möller, University

of Cape Town; Bongani Mthombeni-Möller, Intens Engineering Solutions; Masikana Mdeleeni, PetroSA Synthetic Fuels Innovation Centre (PSFIC), University of the Western Cape; Cyril Knottenbelt, PetroSA, SOUTH AFRICA

11:20 - **Coal to Liquids by Oxidative Cracking in Near-Critical and Super-Critical Water**, Marcos Millan, Pedro Arcelus-Arrillaga, Klaus Hellgardt, Imperial College, UNITED KINGDOM

11:40 - **Optimization of Configurational Alternatives for a Gas to Liquids Process Based on Fischer-Tropsch Technology**, Ashcaan Khazali, Klaus Möller, Eric van Steen, University of Cape Town, SOUTH AFRICA

## SESSION 38

### COMBUSTION TECHNOLOGIES - 4

*Mohsen Alimandegari and Daniel Roberts*

10:20 - **Current Status and Trends in Coal-Based Power Generation Technologies**, N.N. Kinaev, Strategic Energy Consulting/FEFU, AUSTRALIA; Alexey Belov, A.V. Andreev, I.V. Grebenyuk, A.S. Malikov, Far Eastern Federal University, RUSSIA

10:40 - **Low NO<sub>x</sub> Coal Burner Temperature Profile Evaluation**, Dewan Smit, Sandile Peta, Eskom; Walter Schmitz, Reshndren Naidoo, University of Witwatersrand, SOUTH AFRICA

## SESSION 39

### COAL SCIENCE - 8

*Nikki Wagner and Joseph Bittinger*

10:20 - **Desulphurization of South African Coal Using Low Power Microwave Energy**, Herman Potgieter, University of the Witwatersrand and Manchester Metropolitan University; Sanja Potgieter-Vermaak, Manchester Metropolitan University, UNITED KINGDOM; Waseela Mohammed, University of the Witwatersrand, SOUTH AFRICA

10:40 - **A Comparison of Conventional and Unconventional Reductants Through Characterization and Reactivity Tests on Solid State Chromite Reduction for Application in the South African Ferrochrome Industry**, Aaron Chiwoko, Rosemary Falcon, University of Witwatersrand; Lourens Erasmus, Private Industrial Consultant, SOUTH AFRICA

11:00 - **Application of Coal Petrography in Understanding the Variation of Coal Composition in the Coalfields of Botswana**, Ndivhuho Nendouvhada, Nicola Wagner, University of Johannesburg, SOUTH AFRICA; Alan Golding, Analytika Holdings, BOTSWANA

11:20 - **Supercapacitors Based on Carbon Nanofiber Web Containing Coal-Based Asphaltene**, Shiqi Fu, Jiangtao Cai, Shaozhao Ren, Chen Chen, Yating Zhang, Anning Zhou, Xi'an University of Science and Technology, CHINA

11:40 - **Pyrolysis of a Long Flame Coal Under Methanol Vapor**, Xin-fu He, Lei Yang, Hong-ju Wu, Ya-gang Zhang, An-ning Zhou, Xi'an University of Science & Technology, CHINA

## SESSION 40

### COAL SCIENCE - 7

*John Bunt and Leslie Ruppert*

10:20 - **Synthesis of Zeolites from Intermediates of Alumina Recovery from Fly Ash**, Qi Sun, Zhonghua Zhang, Huidong Liu, Yongfeng Xiao, Baodong Wang, National Institute of Clean-and-Low-Carbon Energy, CHINA

## SESSION 41

### GASIFICATION TECHNOLOGIES: MODELING

- 2

*Johan van Dyk and Aleksander Sobolewski*

10:20 - **Simulation of Selected Kazakhstan Coals Gasification Using an Eulerian-Lagrangian Multiphase Particle-In-Cell Approach**, Diyar Tokmurzin, Desmond Adair, Nazarbayev University, KAZAKHSTAN

10:40 - **Syngas Production from Brazilian Coal Chars in the Presence of Steam**, Humberto Jorge José, Regina de Fátima P. M. Moreira, Gabriela Carvalho Collazzo, Michele Di Domenico, Federal University of Santa Catarina, BRAZIL

11:00 - **Evaluation of CO<sub>2</sub> Gasification Reactivity of Biomass and Coal Chars by Physicochemical Properties**, Zhiqing Wang, Jiejie Huang, Yitian Fang, Jiantao Zhao, Libo Dong, State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Chinese Academy of Sciences, CHINA

## SESSION 42

### GASIFICATION TECHNOLOGIES: GENERAL - 5

*Johan Brand and Francis Lau*

10:20 - **Online Detection and Retention of Trace Contaminants in Reducing Gasification Atmosphere**, Philip Edinger, École Polytechnique Fédérale de Lausanne (EPFL) and Paul Scherrer Institut (PSI); Mohamed Tarik, Paul Scherrer Institut (PSI); Christian Ludwig, École Polytechnique Fédérale, SWITZERLAND

10:40 - **Interaction Between Rice Straw and Jincheng Anthracite Single Particle During Ashing Process**, Wenying Li, Zibing Zhao, Qingqing Han, Chengcheng Zhu, Yuhong Qin, Jie Feng, Taiyuan University of Technology, CHINA

11:00 - **Catalytic Gasification with Carbon Dioxide Characteristics of Alkali and Alkaline Earth Metals Catalysts in the Fixed-bed Reactor**, Yifei Wang, Jilin Li, Guangsuo Yu, Fuchen Wang, East China University of Science and Technology, CHINA

11:20 - **Oxygen Co-Gasification of Coal and Rice Straw in Drop Tube Furnace**, Xueli Chen, Jianye Tang, Qinghua Guo, Guangsuo Yu, East China University of Science and Technology, CHINA

## POSTER SESSIONS

Wednesday, August 10, 2016  
17:30 - 19:30

### POSTER SESSION 1 GASIFICATION

P1-1 - **Corrosion Testing of Steel for Production and Injection Well Applications in a UCG Process**, JC van Dyk, African Carbon Energy and North-West University; J Brand, African Carbon Energy; FB Waanders, AC van Wyk, North-West University; C Kahts, Aqua Alpha, SOUTH AFRICA

### POSTER SESSION 2 COMBUSTION

P2-1 - **Influence of Combustion Temperature and Oxygen Concentration in Combustion Medium on Emissions of NO<sub>x</sub>, N<sub>2</sub>O and SO<sub>2</sub>**, Karel Svoboda, Jaroslav Moško, Tomáš Durda, Michael Pohořelý, Boleslav Zach,

# TECHNICAL PROGRAM

Michal Šyc, Aneta Krausová, Michal Jeremiáš, Institute of Chemical Process Fundamentals, Academy of Science of the Czech Republic, CZECH REPUBLIC

## POSTER SESSION 3

### CLEAN COAL AND GAS TO FUELS

P3-1 - **Methanol Synthesis by Catalytic Hydrogenation and Photoelectrochemical Reduction of CO<sub>2</sub>**, Alberto Pettinau, Mauro Mureddu, Francesca Ferrara, Sotacarbo S.p.A., ITALY

## POSTER SESSION 4

### SUSTAINABILITY AND ENVIRONMENT

P4-1 - **Geochemical Mobility of Potential Hazardous Elements of Coal Cleaning Rejects**, Diego de Medeiros, Marcos L.S. Oliveira, Bianca D. Lima, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

P4-2 - **Occurrence of the Hazardous Elements in Agricultural Soils Surrounding a Coal Power Plant Complex From Santa Catarina (Brazil)**, Diego de Medeiros, Marcos L.S. Oliveira, Fagner T.C. Sá, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

P4-3 - **A Density Functional Theory Study on Acetic Acid Decomposition on Ni (111)**, Wenying Li, Yanxiong Ran, Zhenyi Du, Jie Feng, Taiyuan University of Technology, CHINA

## POSTER SESSION 5

### CARBON MANAGEMENT

P5-1 - **Pretreatment of Flue Gas Using Polymeric Membrane for CO<sub>2</sub> Capture**, Soohyun Choi, Ilhyun Baek, Korea Institute of Energy Research, KOREA

P5-2 - **Experimental Study on CO<sub>2</sub> Capture From Simulated Flue Gas by Using Aqueous Ammonia with External Magnetic Field**, Qi Zhang, Jiayi Wu, Ping Lu, Nanjing Normal University, CHINA

## POSTER SESSION 6

### COAL SCIENCE

P6-1 - **Coal Cleaning Residues and Fe-Ultrafine Particles and Fe-Minerals Consequences**, Diego de Medeiros, Felipe B. de Leão, Fagner T.C. de Sá, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA

P6-2 - **Zinc Occurrence in Coal Power Plant Burning Combinations of Coal and Tires**, Diego de Medeiros, Fernanda R. Silveira, Silvio R. Taffarel, Luis F. O. Silva, Centro Universitário La Salle, BRAZIL; Frans Waanders, North West University, SOUTH AFRICA; James C. Hower, University of Kentucky Center for Applied Energy Research, USA

P6-3 - **Hard Carbon From Coal Heavy Organics as Anode Material for Li-Ion Batteries**, Ying Zhou, Yulong Li, Ruiheng Liu, Jun Guan, Peng Wan, Lei He, Weiran Cao, Dongju Ma, Dalian University of Technology, CHINA

P6-4 - **The Relationship between Oxygen Transfer and Pyrolysis Conditions**, Wenying Li, Chaopeng Wang, Huijun Huang, Xiaohong Li, Jie Feng, Taiyuan University of Technology, CHINA

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