



5th International Conference on Chemical Looping

24-27 September 2018, Park City, Utah

FINAL Program Schedule

Last updated: September 12, 2018

MONDAY, SEPTEMBER 24TH – AFTERNOON AND EVENING

16:00 - 19:00

REGISTRATION

16:00 - 18:00

Poster Presenters Set Up Posters

18:00 - 20:00

WELCOME RECEPTION

TUESDAY, SEPTEMBER 25TH – EARLY MORNING

09:00 - 09:10	Welcoming Remarks Kevin Whitty, University of Utah, USA
09:10 - 09:50	KEYNOTE #1: 10,000 h of Chemical-Looping Combustion Operation – Where Are We and Where Do We Want to Go? Anders Lyngfelt, Chalmers University of Technology, SWEDEN
09:50 - 10:30	KEYNOTE #2: Scale-up of Chemical Looping Reactors: Practical Considerations and Design of Industrial Systems Thomas Flynn, Babcock & Wilcox, USA

10:30 - 11:00	COFFEE/TEA BREAK
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TUESDAY LATE MORNING

	Session 1A Oxygen Carriers 1 <i>Session Chair: Hanjing Tian</i> Room: Degas	Session 1B Pilot Plants 1 <i>Session Chair: JoAnn Lighty</i> Room: Renoir	Session 1C Novel Processes 1 <i>Session Chair: Sankar Bhattacharya</i> Room: Monet
11:00 - 11:20	Chemical Looping Combustion: An Oxygen Carrier Production Cost Study Robert STEVENS*, Richard NEWBY, Dale KEAIRNS, Mark WOODS <i>U.S. DOE/NETL, UNITED STATES</i>	Improving the Performance of the Chemical Looping Combustion Process with Coal in a 50 kWth Unit Alberto ABAD*, Raúl PÉREZ-VEGA, Teresa MENDIARA, Pilar GAYÁN, Juan ADÁNEZ <i>Instituto de Carboquímica (ICB-CSIC), SPAIN</i>	A Preliminary Study on the Use Of CaO as Sorbent for Sorption Enhanced Methanation Antonio COPPOLA, Fiorella MASSA, Fabrizio SCALA*, Piero SALATINO <i>University of Naples Federico II, ITALY</i>
11:20 - 11:40	Effect of Supports on the Phase Stability of NiFe₂O₄ in Chemical Looping Process Zhong MA*, Rui XIAO <i>Southeast University, CHINA</i>	Operation of a 50-kW Chemical Looping Combustion Test Facility Under Autothermal Conditions Samuel BAYHAM*, Douglas STRAUB, Justin WEBER <i>U.S. DOE/NETL, UNITED STATES</i>	Chemical Looping Partial Oxidation of Light Paraffins with Mixed-Oxide Redox Catalysts Fanxing LI* <i>North Carolina State University, UNITED STATES</i>
11:40 - 12:00	Improved Impregnation Techniques for CuO-based CLOU Oxygen Carriers Kyle O'MALLEY*, Kevin WHITTY <i>University of Utah, UNITED STATES</i>	Chemical-Looping Combustion in a 100 kW Unit Using a Mixture of Synthetic and Natural Oxygen Carriers - Operational Results Fate of Biomass Fuel Alkali Ivan GOGOLEV*, Carl LINDERHOLM, Dan GALL, M. SCHMITZ, Tobias MATTISSON, Jan B. C. PETERSSON, Anders LYNGFELT <i>Chalmers University of Technology, SWEDEN</i>	Investigation of YBaCo₄O_{7+δ} for Oxygen Looping Processes at Low Temperatures S.R.W. JOHNSTON, B. RAY, W. HU*, I. S. METCALFE <i>Newcastle University, UNITED KINGDOM</i>
12:00 - 12:20	Development of Magnetic Mn-Fe Support Materials for CLC Applications Raúl PÉREZ-VEGA, Pilar GAYÁN*, María T. IZQUIERDO, Alberto ABAD, Francisco GARCÍA-LABIANO, Luis F. DE DIEGO, Juan ADÁNEZ <i>Instituto de Carboquímica (ICB-CSIC), SPAIN</i>	Solid Circulation Characterisitics and Preliminary Test Results in a 0.5 MWth Chemical Looping Combustor Ho-Jung RYU*, Doyeon LEE, Sung-Ho JO, Hyungseok NAM, Jeom-In BAEK <i>KIER, KOREA</i>	Characterization of Limestone Calcination-Carbonation for Thermochemical Energy Storage Applications Claudio TREGAMBI, Fabio MONTAGNARO*, Piero SALATINO, Roberto SOLIMENE <i>University of Naples Federico II, ITALY</i>
12:20 - 12:40	Influence of Heat Treatment On Manganese Ores as Oxygen Carriers Tobias MATTISSON*, Sebastian SUNDQVIST, Patrick MOLDENHAUER, Henrik LEION, Anders LYNGFELT <i>Chalmers University of Technology, SWEDEN</i>	Chemical Looping Pilot Operation in 1 MWth Scale - Lessons Learnt and The Way Forward Jochen STRÖHLE*, Peter OHLEMÜLLER, Bernd EPPLER <i>TU Darmstadt, GERMANY</i>	Ultrafine Hematite Reduction in a Spouting Bed Chemical Looping Reactor Ronald W. BREAUULT*, Samuel BAYHAM, Jarrett RILEY, Narasimhan SOUNDARRAJAN <i>U.S. DOE/NETL, UNITED STATES</i>

12:40 - 14:00	LUNCH
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TUESDAY AFTERNOON

	Session 2A Oxygen Carriers 2 <i>Session Chair: Ben Anthony</i> Room: Degas	Session 2B Pilot Plants 2 <i>Session Chair: Anders Lyngfelt</i> Room: Renoir	Session 2C Novel Processes 2 <i>Session Chair: Andrew Tong</i> Room: Monet
14:00 - 14:20	Exploiting the 'Chemical Memory' of Non-Stoichiometric Materials in Chemical-Looping Processes Ian S METCALFE, Chris DE LEEUWE*, C. MAK, Evangelos I PAPAIOANNOU, Wenting HU*, B. RAY, J.S.O. EVANS <i>Newcastle University, UNITED KINGDOM</i>	Effects of a Two-Stage Fuel Reactor on Chemical Looping Combustion with Methane, Bituminous Coal, Lignite and Wood Biomass Johannes HAUS*, Ernst-Ulrich HARTGE, Joachim WERTHER, Stefan HEINRICH <i>Technical University Hamburg, GERMANY</i>	Chemical Looping CO₂ Activation via Methane Cracking and Iron Oxide Lattice Oxygen Transport Martin KELLER*, Yoshio MATSUZAKI, Junichiro OTOMO <i>The University of Tokyo, JAPAN</i>
14:20 - 14:40	Oxygen Carrier Attrition via a Jet Cup Under Elevated Temperature Conditions Nathan GALINSKY, Samuel BAYHAM*, Esmail MONAZAM, Ronald BREAUULT <i>ORISE, UNITED STATES</i>	First Results from an 80 kW Dual Fluidized Bed Pilot Unit for Solid Fuels at TU Wien Stefan PENTHOR*, Josef FUCHS, Florian BENEDIKT, Johannes C. SCHMID, Anna M. MAUERHOFER, Karl MAYER, Hermann HOFBAUER <i>Technische Universität Wien, AUSTRIA</i>	Low-Pressure Ammonia Synthesis via Chemical Looping Hanjing TIAN*, Jianli HU, Zili WU, Aiqin WANG, Maohong FAN <i>West Virginia University, UNITED STATES</i>
14:40 - 15:00	Reactive Jet and Cyclonic Attrition Analysis of Ilmenite in Chemical Looping Combustion Systems Teagan NELSON*, Daniel LAUDAL, Harry FEILEN, Johannes G. VAN DER WATT, Michael MANN, Srivats SRINIVASACHAR <i>Envergenx, LLC, UNITED STATES</i>	Chemical Looping Combustion of Biomass in a 50 kWth Unit Francisco GARCÍA-LABIANO*, Raúl PÉREZ-VEGA, Antón PÉREZ-ASTRAY, Teresa MENDIARA, Luis F. DE DIEGO, María T. IZQUIERDO <i>Instituto de Carboquímica (ICB-CSIC), SPAIN</i>	Iron-Based Chemical-Looping Technology for Decarbonising Iron and Steel Production Husain BAHZAD*, Matthew E. BOOT-HANDFORD, Niall MAC DOWELL, Nilay SHAH, Paul S. FENNELL <i>Imperial College London, UNITED KINGDOM</i>
15:00 - 15:20	The Melting Characteristics of Ilmenites and Manganese Ores in Chemical Looping Combustion Lei LIU*, Mao CHENG, Hu CHEN, Hui WANG, Ye LI, Zhenshan LI, Weicheng LI, Ningsheng CAI <i>Tsinghua University, CHINA</i>	Bio-CLC Pilot Scale Experiments Combined with CFD Simulations: How to Improve the Performance by Better Design? Toni PIKKARAINEN*, Juho PELTOLA <i>VTT Technical Research Centre, FINLAND</i>	Design of Micro Interconnected Fluidized Bed for Oxygen Carrier Evaluation Tianxu SHEN*, Jingchun YAN, Shouxi JIANG, Xiao ZHU, Laihong SHEN <i>Southeast University, CHINA</i>
15:20 - 15:40	Ageing and Characterization of CaMn_{0.775}Ti_{0.1}Mg_{0.1}O_{3-δ} Particles in a 10 kW_{th} CLC Pilot Plant Arnold LAMBERT*, Airy TILLAND, William PELLETANT, Stéphane BERTHOLIN <i>IFP Energies nouvelles, FRANCE</i>	Scale-Up Operation of a 110 MWth Biomass Fired CFB-Boiler With Oxygen Carriers as Bed Material Angelica CORCORAN, Patrick MOLDENHAUER*, Henrik THUNMAN, Fredrik LIND <i>Chalmers University of Technology, SWEDEN</i>	
16:00 - 18:00	POSTER SESSION		

WEDNESDAY, SEPTEMBER 26TH – EARLY MORNING

08:30 - 9:10

KEYNOTE #3: Scale-Up of Oxygen Carrier Production

Ranjani Siriwardane, U.S. Dept of Energy / NETL, USA

09:20 - 09:40

Session 3A

Oxygen Carriers 3

Session Chair: Douglas Straub

Room: Degas

Perovskite Oxides as Oxygen Carriers for Selective Hydrogen Combustion and Light Paraffin Conversion

Ryan B. DUDEK, Xin TIAN*, Haibo ZHAO, Fanxing LI
North Carolina State University, UNITED STATES

09:40 - 10:00

Superior Lattice Oxygen Reactivity over Ni Modified WO₃-based Redox Catalysts for Chemical Looping Partial Oxidation of Methane

Sai CHEN, Liang ZENG*, Hao TIAN, Xinyu LI, Jinlong GONG
Tianjin University, CHINA

10:00 - 10:20

LD Slag Used as Oxygen Carrier for Combustion Processes

Fredrik HILDOR*, Tobias MATTISSON, Henrik LEION, Carl Johan LINDERHOLM, Malin HANNING, Fredrik LIND, Magnus RYDÉN
Chalmers University of Technology, SWEDEN

10:20 - 10:40

Beneficial Effect of Ca/Sr at A-site and Cu at B-site Substitution of LaNiO₃ on Solar-Thermal Chemical Looping Hydrogen Production

Qiongqiong JIANG, Hui HONG*, Hongguang JIN
Institute of Engineering Thermophysics, CHINA

Session 3B

Air Separation Technologies

Session Chair: Ronald Breault

Room: Renoir

High Performance Copper Manganese Spinel Oxides for Low-Cost Oxygen Production and Other Chemical-Looping Applications

Clemens F. PATZSCHKE*, M. BOOT-HANDFORD, K. CAMPBELL, Q. SONG, P. CLOUGH, E.J. ANTHONY, P. FENNELL
Imperial College London, UNITED KINGDOM

Process Design and Simulation of a Dual Fluidized Bed Reactor for Chemical Looping Air Separation Process

Zhikai DENG, Bo JIN, Zhiwu LIANG (Presenter: Yihan FAN*)
Hunan University, CHINA

Reduction and Oxidation Behavior of Strontium Perovskites for Chemical Looping Air Separation

R. H. GÖRKE, E. MAREK, S. A. SCOTT*
University of Cambridge, UNITED KINGDOM

Chemical Looping for Oxygen Production (CLOP) as Part of the COMPOSITE Concept for High Efficiency Power Production with CO₂ Capture from Solid Fuels

Yngve LARRING*, Mehdi PISHAHANG, Martin SUNDING, Zuoan LI, Schalk CLOETE, John MORUD, Andrew TOBIESEN
SINTEF Industry, NORWAY

Session 3C

Hydrogen Production 1

Session Chair: Kevin Whitty

Room: Monet

30 kWth Moving Bed Chemical Looping System Progress for Hydrogen Production

Cetera CHEN*, Chien-Hua CHEN, Ming-Hu CHANG, Yu-Cheng CHANG, Cheng-Hsien SHEN, Hou-Peng WAN
Industrial Technology Research Institute (ITRI), TAIWAN

Experimental Investigation on Iron Oxide Oxygen Carriers with Macropores for Chemical Looping Hydrogen Generation

Jun HU*, Shiyi CHEN, Wenguo XIANG
Southeast University, CHINA

Using La_{0.8}Sr_{0.4}FeO_{3-δ} for Chemical Looping Hydrogen Production

Christopher DE LEEUWE*, Wenting HU, Ian S. METCALFE
Newcastle University, UNITED KINGDOM

Reaction Front Moving Behaviour in Complex Atmosphere (CO/H₂/CO₂) of Deep Reduction under Chemical Looping Hydrogen Generation

Iwei WANG*, Xiuning HUA, Yidi WANG, Wei WANG
Tsinghua university, CHINA

10:40 - 11:00

COFFEE/TEA BREAK

WEDNESDAY LATE MORNING

	Session 4A Oxygen Carriers 4 <i>Session Chair: Ranjani Siriwardane</i> Room: Degas	Session 4B Carbonate Looping <i>Session Chair: Fabrizio Scala</i> Room: Renoir	Session 4C Hydrogen Production 2 <i>Session Chair: Sebastien Leplat</i> Room: Monet
11:00 - 11:20	Dynamic Study on Combustion Mechanism of Char Chemical Looping over Surface Calcium-doped Copper Oxide Lei BAI, Haiyang LI, Hanjing TIAN*, Jarrett RILEY, William BENINCOSA, Xingbo LIU <i>West Virginia University, UNITED STATES</i>	Preparation of Cage-Like CaO/CuO Hollow Spheres for Enhanced CO₂ Capture in Combined Ca-Cu Looping Jian CHEN*, Lunbo DUAN, Tian SHI, Yuxiao LU, Felix DONAT, Edward J. ANTHONY <i>Southeast University, CHINA</i>	Iron Based Oxygen Carriers for Hydrogen Production – Improved Long Term Stability and In-Situ Time-Resolved Investigation Yoran DE VOS*, A. VAMVAKEROS, D. MATRAS, M. JACOBS, P. VAN DER VOORT, I. VAN DRIESSCHE, S. JACQUES, V. MIDDELKOOP, A. VERBERCKMOES <i>Ghent University and VITO, BELGIUM</i>
11:20 - 11:40	Preventing Agglomeration of Cu-Based Oxygen Carriers for High-Temperature Chemical Looping Applications F. DONAT*, Q. IMTIAZ, A. ARMUTLULU, C.R. MÜLLER <i>ETH Zürich, SWITZERLAND</i>	The Effect of Sulfur Dioxide and Steam on the CO₂ Capture in Calcium Looping: Comparison Between Two Limestones Antonio COPPOLA, Fabio MONTAGNARO*, Alessandro ESPOSITO, Fabrizio SCALA, Piero SALATINO <i>University of Naples Federico II, ITALY</i>	Direct Production of High-Pressure Hydrogen with the Fixed Bed RESC Process Viktor HACKER*, Sebastian BOCK, Robert ZACHARIAS <i>TU Graz, AUSTRIA</i>
11:40 - 12:00	Behaviour of Cu-based Oxygen Carrier with the Presence of Coal Ash in Chemical Looping with Oxygen Uncoupling Ruijie GONG, Changlei QIN*, Donglin HE, Lili TAN, Jingyu RAN <i>Chongqing University, CHINA</i>	Effect of K⁺ on the Calcium Looping Sorbents Modified by Hydration-Impregnation Method for CO₂ Capture Jiaxin XU*, Cong LUO, Yongqing XU, Haoran DING, Liqi ZHANG <i>Huazhong University of Science and Technology, CHINA</i>	An Advancement In CO₂ Utilization Through Novel Gas Switching Dry Reforming – Sensitivity to Temperature Ambrose UGWU*, Abdelghafour ZAABOUT, Schalk CLOETE, Shahriar AMINI <i>Norwegian University of Science and Technology, NORWAY</i>
12:00 - 12:20	Effects of Coal Ash on CuO as Oxygen Carrier for Chemical Looping with Oxygen Uncoupling (CLOU) Jinze DAI*, Kevin WHITTY <i>University of Utah, UNITED STATES</i>	Promoting Multicyclic Activity of Sorbents for CO₂ Capture in Calcium Looping Process under the Constraints of Economic Feasibility Li HE, Kumar R ROUTH*, Asbjørn STRAND, Edd Anders BLEKKAN, De CHEN <i>Norwegian University of Science and Technology, NORWAY</i>	H₂ Production from a Plasma-Assisted Chemical Looping System from the Partial Oxidation of CH₄ at Mild Temperatures Yaoyao ZHENG, Rob GRANT, Wenting HU, Ewa MAREK, Stuart A SCOTT* <i>University of Cambridge, UNITED KINGDOM</i>
12:20 - 12:40	Study of The Physical and Chemical Stability of a Cu-Based Impregnated Oxygen Carrier at Different Temperatures and Conversion Ratios Arturo CABELLO, Luis F. DE DIEGO, Francisco GARCÍA-LABIANO, Alberto ABAD, Pilar GAYÁN, María T. IZQUIERDO*, Juan ADÁNEZ <i>Instituto de Carboquímica (ICB-CSIC), SPAIN</i>	A High Efficient and Durable CO₂ Sorbent Derived from Calcium-Based Metal-Organic Framework Material for Calcium Looping Application Jiawen LIAO, Bo JIN, Zhiwu LIANG (Presenter: Yihan FAN*) <i>Hunan University, CHINA</i>	Chemical Looping Methane Decomposition for the Production of Carbon-Free Hydrogen and Base Growth Carbon Nanotubes over Transition Metal Aerogels Bingying GAO*, I-Wen WANG, Thomas HAINES, Lili REN, Hanjing TIAN, Jianli HU <i>West Virginia University, UNITED STATES</i>
12:40 - 14:00	LUNCH		

WEDNESDAY AFTERNOON

	Session 5A Modeling - Reactors <i>Session Chair: Haibo Zhao</i> Room: Degas	Session 5B Reactor Design 1 <i>Session Chair: Robin Hughes</i> Room: Renoir	Session 5C Gasification 1 <i>Session Chair: Laihong Shen</i> Room: Monet
14:00 - 14:20	<p style="text-align: center;">Modelling and Experimental Study of Petcoke Conversion with an Oxygen Carrier in a Batch Fluidized Bed</p> <p style="text-align: center; font-size: small;">Airy TILLAND*, Vincent BRACCO, Tiago SOZINHO, Jean-Marc SCHWEITZER, Stéphane BERTHOLIN, Mahdi YAZDANPANAHI <i>IFP Energies Nouvelles, FRANCE</i></p>	<p style="text-align: center;">Syngas Chemical Looping Combustion with Allothermal Gasification</p> <p style="text-align: center; font-size: small;">Peter OHLEMÜLLER*, Falah ALOBAID, Ralf STARKLOFF, Michael REITZ, Jochen STRÖHLE, Bernd EPPLE <i>TU Darmstadt, GERMANY</i></p>	<p style="text-align: center;">Effect of Al₂O₃ Addition in Process of Lignite Chemical Looping Gasification Based on CaO Sorbent</p> <p style="text-align: center; font-size: small;">Yi FENG, Qinhui WANG, Hongtao FAN, Leming CHENG*, Zhongyang LUO <i>Zhejiang University, CHINA</i></p>
14:20 - 14:40	<p style="text-align: center;">Process Simulation and Optimization of Chemical Looping Combustion for Mixtures of Coal and Biomass using an Iron Based Oxygen Carrier</p> <p style="text-align: center; font-size: small;">Justin LAM, Ramesh AGARWAL*, Xiao ZHANG <i>Washington University in St. Louis, UNITED STATES</i></p>	<p style="text-align: center;">Experimental Study of Chemical Looping Combustion in an Internally Circulating Reactor</p> <p style="text-align: center; font-size: small;">Mogahid OSMAN*, Abdelghafour ZAABOUT, Schalk CLOETE, Shahriar AMINI <i>Norwegian University of Science and Technology, NORWAY</i></p>	<p style="text-align: center;">Production of CO and Hydrogen Via Chemical Looping Gasification of Coal with Calcium Ferrite and Oxidation with Steam</p> <p style="text-align: center; font-size: small;">Ranjani SIRIWARDANE*, Esmail MONAZAM, Duane MILLER, James POSTON, George RICHARDS <i>U.S. DOE/NETL, UNITED STATES</i></p>
14:40 - 15:00	<p style="text-align: center;">Modelling of Fluidized Bed Reactors for Three Reactor Chemical Looping Configuration</p> <p style="text-align: center; font-size: small;">Ratnakumar KAPPAGANTULA*, Gordon INGRAM, Hari VUTHALURU <i>Curtin University, AUSTRALIA</i></p>	<p style="text-align: center;">Research And Development of a CLC Boiler with an Internally Circulating Fluidized Bed</p> <p style="text-align: center; font-size: small;">Takamichi HOSONO*, Norihiko KUMADA, Takahiro NAKAJIMA, Gen KIYOTAKI, Yusuke IIDA, Minoru IGARASHI, Shin-ichi TODA, Sadayuki MUTOH <i>Kawasaki Heavy Industries Ltd, JAPAN</i></p>	<p style="text-align: center;">Effective Generation of Syngas via Chemical Looping CH₄ Conversion and H₂O-CO₂ Splitting</p> <p style="text-align: center; font-size: small;">Xing ZHU*, Yanpeng CHEN, Fanxing LI, Kongzhai LI, and Hua WANG <i>Kunming University of Science and Technology, CHINA</i></p>
15:00 - 15:20	<p style="text-align: center;">Experimental Investigation and Simulation of the Dynamics in a Chemical Looping Combustion System</p> <p style="text-align: center; font-size: small;">Lennard LINDMUELLER*, Johannes HAUS, Ernst-Ulrich HARTGE, Joachim WERTHER, Stefan HEINRICH <i>Hamburg University of Technology, GERMANY</i></p>	<p style="text-align: center;">Method for Separation of Coal Conversion Products from Sorbents/Oxygen Carriers</p> <p style="text-align: center; font-size: small;">Junior NASAH* <i>University of North Dakota, UNITED STATES</i></p>	<p style="text-align: center;">Hexaaluminate as Oxygen Carrier for Syngas Generation via Chemical Looping CH₄-CO₂ Reforming</p> <p style="text-align: center; font-size: small;">Yanyan ZHU*, Xueyan SUN, Ruilin LIU, Xiaoxun MA, Xiaodong WANG <i>Northwest University, CHINA</i></p>
15:20 - 16:00	COFFEE/TEA BREAK		
16:00 - 22:30	UNIVERSITY OF UTAH COMBUSTION FACILITY TOUR AND CONFERENCE BANQUET		

THURSDAY, SEPTEMBER 27TH – EARLY MORNING

08:30 - 9:10

KEYNOTE #4: Downstream of a Chemical Looping System: CO₂ Sequestration Opportunities and Process Requirements

Brian J. McPherson, Energy & Geosciences Institute, University of Utah, USA

09:20 - 09:40

Session 6A
Modeling - Process and Technoeconomic
Session Chair: Joachim Werther
Room: Degas

Methane to Syngas by Chemical Looping using Fe-Ni Oxygen Carrier: Reactor Design and Process Modeling
Hari MANTRIPRAGADA*, Goetz VESER
University of Pittsburgh, UNITED STATES

09:40 - 10:00

Process Integration of Chemical Looping Combustion with Oxygen Uncoupling in a Biomass-Fired Combined Heat and Power Plant
Petteri PELTOLA*, Jussi SAARI, Tero TYNJÄLÄ, Timo HYPPÄNEN
Lappeenranta University of Technology, FINLAND

10:00 - 10:20

Economic Analysis of Pressurized Chemical Looping Combustion for SAGD Applications
Arturo CABELLO, Robin W. HUGHES*, Robert T. SYMONDS, Scott CHAMPAGNE, Dennis LU, Ehsan MOSTAFAVI, Nader MAHINPEY
CanmetENERGY, CANADA

10:20 - 10:40

Thermodynamic and Economic Evaluation of a Full Scale Chemical Looping Plant
Peter OHLEMÜLLER*, Maxime OLAUSSON, Matthias JOHN, Falah ALOBAID, Jochen STRÖHLE, Bernd EPPLE
TU Darmstadt, GERMANY

10:40 - 11:00

COFFEE/TEA BREAK

Session 6B

Reactor Design 2
Session Chair: Juan Adánez
Room: Renoir

CHEERS Pilot Plant – An Original Design Dedicated to CLC Efficiency
Florent GUILLOU*, Sina TEBIANIAN, Airy TILLAND, Arnold LAMBERT, Stéphane BERTHOLIN, Mahdi YAZDANPANAHI
IFPEN, FRANCE

Heat Balance Analysis of a 3 MWth Pilot Plant for CLC Demonstration
Hu CHEN*, Mao CHENG, Lei LIU, Zhenshan LI, Ningsheng CAI, Weicheng LI
Tsinghua University, CHINA

Dynamic Characteristics on a Cold-model of Gushing Reactor for Intensifying Chemical Looping Process
Xiao ZHU*, Tianxu SHEN, Jiang ZHANG, Laihong SHEN, Ping LU
Southeast University, CHINA

Application of MP-PIC on Dual Interconnected Chemical Looping Cold Flow System: Validation Process with Hydrodynamic Experiments
Matthew A. HAMILTON*, Zachary REINKING, Kevin J. WHITTY, JoAnn S. LIGHTY
CPFD Software Inc., UNITED STATES

Session 6C

Gasification 2
Session Chair: Øyvind Langørgen
Room: Monet

Influence of Bed Material Cycle Rate and Temperatures on the CO₂ Transport during Sorption Enhanced Reforming of Biomass
Josef FUCHS, J.C. SCHMID, F. BENEDIKT, Anna M. MAUERHOFER*, S. PENTHOR, S. MÜLLER, H. HOFBAUER
Vienna University of Technology, AUSTRIA

Chemical Looping Gasification of Biomass Pellets With a Manganese Ore as Oxygen Carrier
Tao SONG*, Shangyi YIN, Tianxu SHEN, Maksym DOSTA, Ernst-Ulrich HARTGE, Jun XIAO, Stefan HEINRICH, Laihong SHEN, Joachim WERTHER
Nanjing Normal University, CHINA

Chemical Looping Gasification of Lignin Biomass with Bimetallic Oxygen Carriers
Thomas HAINES, Jingli WU*, Hanjing TIAN, William BENINCOSA, Jarrett RILEY, Ranjani SIRIWARDANE, Zhiqi WANG, JinHu WU
West Virginia University, UNITED STATES

Chemical Looping CH₄ Decomposition and CO₂ Reduction over Ce/Ni Doped Ca₂Fe_xAl_{2-x}O₅ Catalyst: A New Pathway for Continuous CO₂ Conversion with Almost-Pure H₂ and CO Production
Zhao SUN*, Jun HU, Shiyi CHEN, Wenguo XIANG
Southeast University, CHINA

THURSDAY LATE MORNING

	Session 7A Modeling - CFD <i>Session Chair: Hong-Shig Shim</i> Room: Degas	Session 7B Reactor Operation 1 <i>Session Chair: Toni Pikkarainen</i> Room: Renoir	Session 7C Gasification 3 <i>Session Chair: Liang-Shih Fan</i> Room: Monet
11:00 - 11:20	CFD Simulations of Chemical Looping Combustion in a Packed Bed and a Bubbling Bed Fuel Reactor Ramesh AGARWAL*, Guanglei MA <i>Washington University in St. Louis, UNITED STATES</i>	Coal and Biomass Combustion by Chemical Looping with Oxygen Uncoupling (CLOU) with Cu and Cu-Mn Materials Iñaki ADÁNEZ-RUBIO, Raúl PÉREZ-VEGA, Antón PÉREZ-ASTRAY, Teresa MENDIARA, Juan ADÁNEZ* <i>Instituto de Carboquímica (ICB-CSIC), SPAIN</i>	Y Promoted Fe₂O₃/Al₂O₃ as Oxygen Carriers for Syngas Production Yu KANG*, Ming TIAN, Xiaodong WANG <i>Dalian Institute of Chemical Physics, CHINA</i>
11:20 - 11:40	Three Dimensional Full Loop Simulation for a Coal-Direct Chemical Looping System with a Two-Stage Air Reactor Yali SHAO*, Xiaojia WANG, Baosheng JIN, Xudong WANG, Yong ZHANG <i>Southeast University, CHINA</i>	Evaluation of Chemical Looping Combustion Behaviour Using Victorian Brown Coal with Ilmenite Seng LIM, Doki YAMAGUCHI, Lianguang TANG, José ORELLANA, Trevor HADLEY, Sankar BHATTACHARYA* <i>CSIRO Energy, AUSTRALIA</i>	Catalyst-Assisted Chemical Looping Auto-Thermal Dry Reforming: The Effect of Operating Pressure Jiawei HU*, Vladimir V. GALVITA, Hilde POELMAN, Guy B. MARIN <i>Ghent University, BELGIUM</i>
11:40 - 12:00	Computational Simulation of a Dual Circulating Fluidized Bed Reactor Processing Coal by Chemical Looping with Oxygen Uncoupling Zachary REINKING*, Kevin WHITTY, JoAnn LIGHTY <i>University of Utah, UNITED STATES</i>	Evaluation of Coal Conversion in a Fluidized Bed Chemical Looping Reactor Using Copper-Based Oxygen Carriers Kirsten M. MERRETT*, Kevin J. WHITTY <i>University of Utah, UNITED STATES</i>	Reactivity of Layered Double Hydroxides Derived Physical Mixture and Alloy of Fe-Ni-Al-O Oxygen Carriers for Chemical Looping Reforming Process Yihan FAN*, Bo JIN, Zhiwu LIANG <i>Hunan University, CHINA</i>
12:00 - 12:20	CPFD Simulation and Optimization For a 50 kWth Dual Circulating Fluidized Bed Reactor For Chemical Looping Combustion Of Coal Xi CHEN*, Jinchen MA, Haibo ZHAO <i>Huazhong University of Science and Technology, CHINA</i>	NO and NH₃ Conversion over Ilmenite and Iron Oxide Stefan MAYRHUBER, Fredrik NORMANN, Henrik LEION*, Tobias MATTISSON, Sebastian SUNDQVIST <i>Chalmers University of Technology, SWEDEN</i>	Moving Bed Chemical Looping Process Development for Syngas and Hydrogen Production from Fossil and Renewable Fuels Andrew TONG*, T.-L. HSIEH, D. XU, Y. ZHANG, D. WANG, S. NADGOUDA, M. KATHE, F. KONG, Liang-Shih FAN <i>Ohio State University, UNITED STATES</i>
12:20 - 12:40	Application of Recent CFD Advancements to the Modeling of Chemical Looping Systems James PARKER*, Andrew LARSON <i>CPFD Software Inc., UNITED STATES</i>	Coal-Fired Chemical-Looping Combustion Coupled with a High Efficient Annular Carbon Stripper Mao CHENG, Hu CHEN, Lei LIU, Ye LI*, Zhenshan LI, Weicheng LI, Ningsheng CAI <i>Tsinghua University, CHINA</i>	Packed Bed Chemical Looping Reforming Process for Production of Bulk Chemicals Vincenzo SPALLINA*, Goharsharieh MOTAMEDI, Fausto GALLUCCI, Martin VAN SINT ANNALAND <i>University of Manchester, UNITED KINGDOM</i>
12:40 - 14:00	LUNCH		

THURSDAY AFTERNOON

	Session 8A Modeling - Chemical Reactions <i>Session Chair: Stéphane Bertholin</i> Room: Degas	Session 8B Reactor Operation 2 <i>Session Chair: Johannes Haus</i> Room: Renoir	(no session) Room: Monet
14:00 - 14:20	Experimental Study and Particle Scale Modeling of a CuO-Fe₂O₃-Al₂O₃ Oxygen Carrier for Chemical Looping Combustion Applications Jarrett RILEY*, Ranjani SIRIWARDANE, Hanjing TIAN, William BENINCOSA <i>U.S. DOE/NETL, UNITED STATES</i>	Effect of Volatile on Natural Iron-Based Oxygen Carriers during Long Operation of Chemical Looping Combustion of Victorian Brown Coal Imtenan SAYEED*, Srikanth SRIVATSA, Sankar BHATTACHARYA <i>Monash University, AUSTRALIA</i>	
14:20 - 14:40	Products Distribution and Kinetic Analysis during Chemical Looping with Oxygen Uncoupling of Lignocellulosic Biomass Main Compound Zhiqiang WU*, Y. LI, G. LI, S. WU, S. ZHAO, Bo ZHANG, Bolun YANG <i>Xi'an Jiaotong University, CHINA</i>	Systematic Investigation on Sulfur Behaviour in Coal-Derived In-Situ Gasification Chemical Looping Combustion Process Chaoquan WANG, Jinchen MA*, Haibo ZHAO, Xin TIAN <i>Huazhong University, CHINA</i>	
14:40 - 15:00	CO₂ Gasification of a Lignite Char in a Micro-Fluidised Bed Thermogravimetric Analysis (MFB-TGA) for CLC/CLOU Ye LI*, Hui WANG, Weicheng LI, Zhenshan LI, Ningsheng CAI <i>Tsinghua University, CHINA</i>	Industrial Implementation of Oxygen Carrier Aided Combustion Angelica CORCORAN*, Pavleta KNUTSSON, Henrik THUNMAN, Fredrik LIND <i>Chalmers University of Technology, SWEDEN</i>	
15:00 - 15:20	Reduced Chemical Mechanim for Chemical Looping with Oxygen Uncoupled Combustion System Hong-Shig SHIM*, Dave WANG, James PARKER, Kevin WHITTY, Marc CREMER, Kevin DAVIS <i>Reaction Engineering International, UNITED STATES</i>	Experience with Chemical Looping Combustion of Coal in a 200 kW Dual Fluidized Bed Reactor Kevin J. WHITTY*, David R. WAGNER, Zsolt DOBO, Kirsten M. MERRETT, Jinze DAI <i>University of Utah, UNITED STATES</i>	
15:30 - 16:30	PANEL DISCUSSION Moderated by JoAnn Lighty, Boise State University, USA		
	CLOSE OF CONFERENCE		