INFUB

11th EUROPEAN CONFERENCE ON INDUSTRIAL FURNACES AND BOILERS

ALBUFEIRA · ALGARVE · PORTUGAL · 18-21 APRIL 2017

PROGRAMME

TUESDAY: 18 APRIL

15:00 – 18:00 **REGISTRATION**

18:00 – 19:30 **OPENING SESSION**

WELCOME ADDRESS
Albino Reis
Cenertec – Centro de Energia e Tecnologia
Portugal

KEYNOTE LECTURE
INDUSTRIAL FURNACES – STATUS AND RESEARCH CHALLENGES
Herbert Pfeifer
RWTH Aachen
GERMANY

20:00 **WELCOME DINNER AT THE GRANDE REAL SANTA EULÁLIA RESORT & HOTEL SPA – RESTAURANTE COZINHA REAL**

WEDNESDAY: 19 APRIL

08:30 – 11:25
CHAIRMAN
Reinhold Kneer
RWTH Aachen University
GERMANY

08:30 – 09:20 **KEYNOTE LECTURE**
BURNERS IN THE STEEL INDUSTRY
Sébastien Caillat
Fives Group
FRANCE

09:20 – 11:25 **ORAL SESSION: BURNERS, COMBUSTION AND HEAT TRANSFER**

09:20 – 09:45 **Power-to-Gas and the consequences: Impact of higher hydrogen concentrations in natural gas on industrial combustion processes**
Tim Nowakowski, Jörg Leicher, Anne Giese and Klaus Görner
Gas-und Wärme-Institut Essen e. V., Essen (Germany)

09:45 – 10:10 **Analysis of a 20 kW flameless furnace fired by natural gas**
Marco Ferrarotti, Delphine Lupant and Alessandro Parente
Université Libre de Bruxelles and Faculté Polytechnique de Mons (Belgium)

10:10 – 10:35 **COFFEE – BREAK**

10:35 – 11:00 **Numerical investigations on post-combustion in a burner for heat treatment furnaces with reducing gas atmosphere**
Nico Schmitz, Christian Schwotzer, Herbert Pfeifer, Joachim G. Wünning, E. Cresci and J. Schneider
RWTH Aachen University, Department for Industrial Furnaces and Heat Engineering and WS Wärmeprozesstechnik GmbH (Germany)

11:00 – 11:25 **Oxy-fuel burner investigations for CO2 capture in cement plants**
Francisco Carrasco Maldonado, Jørn Bakken, Mario Ditaranto, Nils E. L. Haugen, Øyvind Langørgen, Simon Grathwohl, Jörg Maier and Günter Scheffknecht
IFK - University of Stuttgart (Germany) and SINTEF-ER (Norway)

11:25 – 13:15 **POSTER SESSION: BURNERS, COMBUSTION AND HEAT TRANSFER**
MODELLING OF FURNACES AND COMBUSTION SYSTEMS
POLLUTION ASPECTS

Laminar burning velocity and flame propagation speed close to the wall in premixed methane-air flames
Loreto Pizzuti, Cristiane Martins, Leila Ribeiro dos Santos and Danielle Guerra
ITA Instituto Tecnológico da Aeronáutica and Universidade Federal do Pará (Brazil)

On the effect of separated oxygen and carbon dioxide injections on the stabilisation of diluted oxyfuel flames
Sarah Juma, David Honore, Bertrand Lecordier, Xavier Paubel and Armelle Cessou
CORIA - CNRS, Normandie Université, Université de Rouen and Air Liquide (France)

Combustor concept for industial gas turbines with single digit NOX and CO emission values
Ahmad Al-Halbouni, Anne Giese, E. Tali, Jörg Leicher, R. Albus and Klaus Görner
Gas- und Wärme-Institut Essen e.V. (Germany)

Ceramic heat pipes for high temperature application
Nina Hack, Simon Unz and Michael Beckmann
Technische Universität Dresden (Germany)

Laminar burning velocities of low calorific and hydrogen containing fuel blends
Sven Eckart, Christina Penke, Stefan Voss and Hartmut Krause
TU Bergakademie Freiberg (Germany)

Numerical approach for the implementation of the interaction of pyrolysis gases and combustion products in an aluminium melting furnace
Rukiye Gültekin, Antje Rückert and Herbert Pfeifer
Department of Industrial Furnaces and Heat Engineering (Germany)

Natural gas quality fluctuations-urveys and statistics on the situation in Germany
Jörg Leicher, Anne Giese, Klaus Görner, Matthias Werschy, Hartmut Krause and H. Doerr
Gas- und Wärme-Institut Essen e.V. and DBI Gas- und Umwelttechnik GmbH (Germany)

Pulverized coal ignition testing under Air-Fired conditions using the Zelkowski method: comparison of coals of different rank and provenience
Anna Becker, Martin Schiemann, Viktor Scherer, Daniel Haxter and Johannes Mayer
Ruhr-University and Uniper Technologies GmbH (Germany)

Key parameters for the radiative emittance of ashes of solid fuels
Jeanette Gorewoda and Viktor Scherer
Ruhr-Universität Bochum (Germany)

Ultra-Low NOx Oxygen-enriched combustion system using oscillation combustion method
Yoshiyuki Hagihara, Tomoyuki Haniji, Yasuyuki Yamamoto and Kimio Iino
TAIYO NIPPON SANSO Co., Gas Application Technology Center and TAIYO NIPPON SANSO Co. (Japan)

Co-combustion of unburned carbon separated from lignite fly ash
Wieslaw Rybak, Wojciech Moroń, Krzysztof Czajka, Anna Kisiela, Wieslaw Ferens, W. Jodkowski and Cz. Andryjowicz
Wroclaw University of Technology and PGE GiEK S.A (Poland)

Liquid hydrocarbons combustion with supplying of superheated steam jet
Igor Anufriev, Oleg Sharypov, Evgeniy Kopyev and Sergey Alekseenko
Kutateladze Institute of Thermophysics, SB Russian Academy of Sciences (Russia)

Conical quarl swirl stabilized non-premixed flames: flame and flow field interaction
Ayman Elbaz and William Roberts
King Abdullah University of Science and Technology, KAUST (Saudi Arabia) and Helwan University (Egypt)

Experimental and numerical investigation of an ultra-low NOx methane burner
Ingrid El Helou, Jenna Foale, Andrea Giusti, Jenni Sidey and Epaminondas Mastorakos
University of Cambridge (United Kingdom)

Design of a drying furnace for big motors
Dolores Demarco and Pablo Marino
Tenaris Siderca (Argentina)

Development of an atmosphere particle kinetic model for particle reactions in a combustion Flash-Reactor using CFD- methods.
Franz Edler, Bernhard Geier, Wolfgang Reiter, Johannes Rieger, Christoph Spijker and Harald Raupenstrauch
K1-met GmbH and Montanuniversitaet Leoben (Austria)

Validation of turbulence/Chemistry interaction models for use in Oxygen Enhanced Combustion
Rene Prieler, Petr Bělohradský, Bernhard Mayr, Andreas Rinner and Christoph Hochenauer
Graz University of Technology and Brno University of Technology (Austria)

CFD modelling of a small-scale cyclonic combustor chamber using biomass powder
Rodrigo Lima, Danielle Guerra and Manoel Nogueira
Federal University of Pará (Brazil)

A gas radiation property model applicable to general combustion CFD and its demonstration in oxy-fuel combustion simulation
Chungen Yin, Shashank Singh and Sergio Sanchez Romero
Aalborg University (Denmark)

Core-annulus model development and simulation of a CFB boiler furnace
Aleksi Mankonen, Esa Vakkilainen, Vitaliy Sergeev and Juha Kaikko
Lappeenranta University of Technology (Finland) and Peter the Great St. Petersburg Polytechnic University (Russia)

Analysis of the processes in fluidized bed boiler furnaces during load changes
Marko Huttunen, Juho Peltola, Sirpa Kallio, Lassi Karvonen, Timo Niemi and Ville Ylä-Outinen
Technical Research Centre of Finland and Valmet Technologies Oy (Finland)

Review on mathematical models for travelling-grate iron oxide pellet induration furnaces
Mariana Carvalho, Manuel García Pérez, Debora Faria, Marcelo Cardoso and Esa Vakkilainen
Lappeenranta University of Technology (Finland) and Federal University of Minas Gerais (Brazil)

Radiant tubes lifetime prediction in steel processing lines using fluid–structure interaction modelling
Sébastien Caillat and Catherine Pasquinet
Fives Stein (France)

Influence of particle size distribution on the limestone decomposition in single shaft kilns
Hallak Bassem, Fabian Herz, Eckehard Specht, Robin Gröpler and Gerald Warnecke
Otto von Guericke University Magdeburg (Germany)

Combustion behavior of coke in shaft kilns with hypostoichiometric air flow
Bassem Hallak, Nyein Nyein Linn, Eckehard Specht and Fabian Herz
Otto von Guericke University Magdeburg (Germany)

Mathematical model to investigate the influence of circulation systems on the firing of ceramics
Tino Redemann and Eckehard Specht
Otto von Guericke University Magdeburg (Germany)

Impact of solid body emissivity on radiative heat transfer efficiency in furnaces – a numerical study
Melanie Grote, Elmar Pohl, H. Saptogino and David Diarra
OWI-Oel-Waerme-Institut GmbH (Germany)

Flow mixing in the gap between the cars in tunnel kilns
Adnan Al-Hasnawi, Abdul Qayyum and Eckehard Specht
Otto von Guericke University Magdeburg (Germany) and University of Technology-Baghdad (Iraq)

Unified ignition – devolatilization model for fixed bed biomass gasification/combustion
Jaganathan V. M., A. Mani Kalyani and Varunkumar S.
Indian Institute of Technology (India)

An experimental and numerical study of MILD combustion in a Cyclonic burner
Giancarlo Sorrentino, Ugur Göktolga, Mara De Joannon, Jeroen Van Oijen, Antonio Cavaliere and Philip De Goey
Istituto di Ricerche sulla Combustione - Consiglio Nazionale delle Ricerche (Italy), DICMaPI - Università degli Studi di Napoli Federico II (Italy) and Eindhoven University of Technology (Netherlands)

Conversion of biomass fuel in a fluidized bed using a DEM-CFD model
Mohammad Mohseni and Bernhard Peters
University of Luxembourg (Luxembourg)

CFD modeling of combustion in biomass furnace
João Silva, José Teixeira, Senhorinha Teixeira, Simone Preziati and João Cassiano
Universidade do Minho and EDP (Portugal)

Numerical studies of premixed and diffusion meso/micro-scale flames
A. Cova, P.R. Resende, A. Cuoci, M. Ayoobi, A.M. Afonso and C.T Pinho
Universidade do Porto (Portugal), Universidade Estadual Paulista (Brazil), Politecnico di Milano (Italy) and Wayne State Univ. (USA)

Rotating cylinders for development of convection in high temperature coil annealing (HTCA) furnaces
Oula Fatla, Agustin Valera-Medina, Fiona Robinson, Mark Cichuta and Nathan Beynon
Cardiff University (United Kindgom), Al-Qadisya University (Iraq), COGENT Power and TATA Steels (United Kingdom)

Innovative technological solutions moving towards the realization of a stand-alone biomass boiler with near-zero particulate emissions
Augusto Bianchini, Filippo Donini, Marco Pellegrini, Jessica Rossi, Cesare Saccani
University of Bologna (Italy),

Study on the influence of ethanol and butanol addition on soot formation in iso-octane flames
Isabel Frenzel, Hartmut Krause and Dimosthenis Trimis
TU Bergakademie Freiberg and Karlsruhe Institute of Technology (Germany)

13:15 – 14:30 **LUNCH**

14:30 – 17:45 **CHAIRMAN**
Jean-Bernard Michel
University of Applied Science Western Switzerland
SWITZERLAND

14:30 – 15:20 **KEYNOTE LECTURE**
LIME SHAFT KILNS
Hannes Piringer
Maerz Ofenbau AG
SWITZERLAND

15:20 – 17:45 **ORAL SESSION: ALTERNATIVE FUELS**

15:20 – 15:45 **Preheated oxyfuel combustion adapted to low calorific blast furnace gas**
Abou Bâ, Armelle Cessou, Niomar Marcano, Faustine Panier, Rémi Tsiava, Guillaume Cassarino, Ludovic Ferrand and David Honore
CORIA - CNRS, Normandie Université, Université de Rouen, Air Liquide Paris-Saclay Research Center and CMI GreenLine Europe (France)

15:45 – 16:10 **Experimental and numerical investigation of a MILD-based Stirling engine fed with landfill gas**
Valentina Fortunato, Abdallah Abou-Taouk and Alessandro Parente
Université Libre de Bruxelles, Chalmers Unisersity of Technology and Cleanergy AB (Belgium)

16:10 – 16:30 **COFFEE – BREAK**

16:30 – 16:55 **CO/CO2 Ratio in biomass char oxidation**
Andrés Anca-Couce, Peter Sommersacher, Ali Shiehnejadhesar, Ramin Mehrabian, Christoph Hochenauer and Robert Scharler
Graz University of Technology and BIOENERGY 2020+ GmbH (Austria)

16:55 – 17:20 **Measuring gaseous HCl emissions during pulverised co-combustion of high shares of straw with coal in an entrained flow reactor**
Christian Wolf, Andreas Stephan, Sebastian Fendt and Hartmut Spliethoff
Technical University of Munich (Germany)

17:20 – 17:45 **Numerical study on the influence of operational settings on refuse derived fuel Co-firing in cement rotary kilns**
Birk Liedmann, Siegmar Wirtz, Viktor Scherer and Burkhard Krüger
Ruhr-University, Bochum and Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT (Germany)

▪ THURSDAY: 20 APRIL

08:30 – 12:40 **CHAIRMAN**
Roman Weber
TU Clausthal
GERMANY

08:30 – 09:20 **KEYNOTE LECTURE**
SIMULATION OF REACTING MOVING GRANULAR MATERIAL IN FURNACES – AN OVERVIEW ON THE CAPABILITIES OF THE DISCRETE ELEMENT METHOD
Viktor Scherer
Ruhr-Universität Bochum
Germany

09:20 – 09:50 **Prof. Wolfgang Leuckel – A Lifetime in Combustion**
Thomas Kolb
Karlsruhe Institute of Technology
Germany

09:50 – 10:10 **COFFEE – BREAK**

10:10 – 11:50 **ORAL SESSION: MODELLING OF FURNACES AND COMBUSTION SYSTEMS**

10:10 – 10:35 **CFD modelling and performance increase of a pusher type reheating furnace using oxy-fuel burners**
Bernhard Mayr, Rene Prieler, Martin Demuth, Luca Moderer and Christoph Hochenauer
Graz University of Technology, Messer Austria GmbH and Marienhütte GmbH (Austria)

10:35 -11:00 **Modeling of a walking beam furnace using CFD – methods**
Werner Pollhammer, Christoph Spijker, Jakob Six and Harald Raupenstrauch
K1-MET GmbH, Montanuniversitaet Leoben and voestalpine Stahl GmbH (Austria)

11:00 – 11:25 **Burner design for an industrial furnace operating at conditions of thermal post-combustion**
Jordan A. Denev, Ilian Dinkov and Henning Bockhorn
Karlsruhe Institute of Technology and Engler-Bunte-Institute (Germany)

11:25 – 11:50 **Modelling of flameless oxy-fuel combustion with emphasis on radiative heat transfer for low calorific value blast furnace gas**
Phuc Danh Nguyen, Ghassan Ghazal, Víctor Cuervo Piñera, Valerio Battaglia, Anders Rensgard, Tomas Ekman and Moncef Gazdallah
ArcelorMittal (France and Spain), Centro Sviluppo Materiali (Italy), Swerea MEFOS (Sweden), AGA Linde (Sweden) and University of Mons (Belgium)

11:50 – 12:40 **KEYNOTE LECTURE**
A REVIEW OF RADIATION MEASUREMENT AND MODELLING TECHNIQUES APPLICABLE TO INDUSTRIAL COMBUSTION
Klas Andersson
Chalmers University of Technology
Sweden

12:40 – 13:45 **LUNCH**

13:45 – 15:25 **CHAIRMAN**
David Honoré
CORIA – CNRS, INSA de Rouen
FRANCE

13:45 – 15:25 **ORAL SESSION: MODELLING OF FURNACES AND COMBUSTION SYSTEMS**

13:45 – 14:10 **Collaborative simulations and experiments for development and uncertainty quantification of a reduced char oxidation and gasification model in oxy-coal combustion conditions**
Salvatore Iavarone, Benjamin Isaac, Sean Smith, Philip Smith and Alessandro Parente
Université Libre de Bruxelles (Belgium) and University of Utah (USA)

14:10 – 14:35 **Integrated transient simulation of a BFB boiler with CFD models for the BFB furnace and dynamic system models for the steam cycle and boiler operation**
Ville Hovi, Marko Huttunen, Ismo Karppinen, Timo Pättikangas, Hannu Niemistö, Lassi Karvonen, Sirpa Kallio, Sami Tuuri and Ville Ylä-Outinen
VTT Technical Research Centre of Finland Ltd, Fortum Power and Heat Ltd and Valmet technologies Oy (Finland)

14:35 – 15:00 **The virtual biomass grate furnace - an overall CFD model for biomass combustion plants**
Ali Shiehnejadhesar, Ramin Mehrabian, Christoph Hochenauer and Robert Scharler
BIOENERGY 2020+ GmbH and Graz University of Technology (Austria)

15:00 – 15:25 **Modeling and validation of the siderite decomposition in a rotary kiln**
Fabian Herz and Eckehard Specht
Otto von Guericke University Magdeburg (Germany)

16:30 – 20:00 **TOUR: Armação de Pêra – Carvoeiro/Algar Sêco - Ferragudo – Arade River**

▪ FRIDAY: 21 APRIL

08:30 – 11:45 **CHAIRMAN**
Harald Raupenstrauch
Montanuniversitaet of Leoben
AUSTRIA

08:30 – 09:20 **KEYNOTE LECTURE**

SAFETY ASPECTS OF COMBUSTION EQUIPMENT IN THE OIL & GAS INDUSTRY
Jacques Dugué
TOTAL Refining and Chemicals
France

09:20 – 11:45 **ORAL SESSION: FURNACE AND BOILER OPERATION**

09:20 – 09:45 **Advancing grate-firing for greater environmental impacts and efficiency for decentralized biomass/wastes combustion**
Chungen Yin
Aalborg University (Denmark)

09:45 – 10:10 **Quantification of Release of Critical Elements, Formation of Fly Ash and Aerosols – Status on Current Undestanding and Research Needs**
Flemming J. Frandsen
Technical Univesity Of Denmark (Denmark)

10:10 – 10:30 **COFFEE – BREAK**

10:30 – 10:55 **Energy Efficient Strip Annealing through Roll Regenerative Furnace**
Michel Renard and Jean-Marie Buchlin
Drever International S.A. and von Karman Institute for Fluid Dynamics (Belgium)

10:55 – 11:20 **A technology comparison concerning scale dependencies of Industrial Furnaces- A case study of glass production**
Corina Dorn, Ralph Behrend, Volker Uhlig, Dimosthenis Trimis and Hartmut Krause
TU Bergakademie Freiberg and Karlsruhe Institute of Technology (Germany)

11:20 – 11:45 **Experimental and numerical study of MILD combustion in a lab-scale furnace**
X. Huang, M.J. Tummers and D.J.E.M. Roekaerts
Delft University of Technology (Netherlands)

11:45 – 13:15 **POSTER SESSION: FURNACE AND BOILER OPERATION**
ALTERNATIVE FUELS

Performance quantification of a cyclonic boiler using biomass sawdust
Alan Carneiro, Diego de Oliveira, Matheus Rocha, Marcelo Silva, Danielle Guerra and Manoel Nogueira
Federal University of Pará and Amazoniam Federal Rural University (Brazil)

Improvement of load-following capacity of grate boilers based on the combustion power soft-sensor
Jukka Kortela and Sirkka-Liisa Jämsä-Jounela
Aalto University, School of Chemical Technology (Finland)

Investigations on container materials in high temperature microwave applications
Ralph Behrend, Corina Dorn, Volker Uhlig and Hartmut Krause
TU Bergakademie Freiberg (Germany)

The development of opto-acoustic diagnostic systems for industrial thermal processing plants
Philipp Pietsch, Matthias Werschy and Hartmut Krause
DBI Gas- und Umwelttechnik GmbH (Germany)

Combustion of solid fuel in a hybrid porous reactor
Vojislav Jovicic, Nataliia Fedorova, Ana Zbogar-Rasic, Fernando Reichert, Daniel M. Nloka and Antonio Delgado
Institute of Fluid Mechanics (LSTM) and Erlangen Graduate School in Advanced Optical Technologies (SAOT) (Germany)

Local steam temperature imbalances of coal-fired boilers at very low load
Jens Hinrich Prause, Moritz Hübel, Dorian Holtz, Jürgen Nocke and Egon Hassel
FVTR GmbH and University of Rostock (Germany)

Application of the carbon looping (Carboloop) concept in a novel twin-bed reactor
Antonio Coppola, Osvalda Senneca and Piero Salatino
Istituto di Ricerche sulla Combustione - Consiglio Nazionale delle Ricerche and Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale - Università degli Studi di Napoli Federico II (Italy)

Furnace combustion and control renovation to improve the productivity of a continuous annealing line
Hai Wu, Bertie van Benschop, Omar Ben Driss, Ferry Frinking and Ramon Speets
Tata Steel R&D and Tata Steel DO (Netherlands)

New developments in flow sensors for industrial furnaces
Oliver Seifert
Endress+Hauser Flowtec AG (Switzerland)

Effect of increasing load on the MILD combustion of COG and its blend in a 30 kW furnace using low air preheating temperature
Gabriele Mosca, Delphine Lupant and Paul Lybaert
Faculté Polytechnique de Mons (Belgium)

Energetic and environmental performances of a domestic hot water condensing boiler fired by wood pellets
Philippe Ngendakumana, Fabian Gabriele, Yannick Restivo and Kévin Sartor
University of Liège (Belgium)

Numerical CFD simulations for optimizing a biomass gasifier and methanation reactor design and operating conditions
Victoria Bogdanova, Erwin George, N. Meynet, Y. Kara and A. Barba
ENGIE (France)

Use of low-quality biogenic fuels in a decentralized biomass boiler for thermal energy generation
Franziska Reinardt, Helmut Seifert and Hans-Joachim Gehrmann
Karlsruhe Institute of Technology (Germany)

Production of hydrogen by autothermal reforming of biogas
Florian Rau, Andreas Herrmann, Hartmut Krause, Debora Fino and Dimosthenis Trimis
TU Bergakademie Freiberg, (Germany), Politecnico di Torino (Italy) and Karlsruhe Institute of Technology (Germany)

Biogas as a co-firing fuel in thermal processing industries: implementation in a glass melting furnace
Marcel Fiehl, Jörg Leicher, Anne Giese, Klaus Görner, Bernhard Fleischmann and Simone Spielmann
Gas- und Wärme-Institut Essen e.V., Hüttentechnische Vereinigung der Deutschen Glasindustrie e.V. and Verallia-Saint-Gobain Oberland AG (Germany)

Online corrosion measurements in small-, mid- and power plant scale during pulverised biomass/coal co-combustion
Andreas Stephan, Christian Wolf, Sebastian Fendt and Hartmut Spliethoff
Technical University of Munich (Germany)

An optimal algorithm to assess the compliance with the T2s requirement of Waste-to-Energy facilities
Federico Viganò and Francesco Magli
Politecnico di Milano, Consorzio LEAP (Laboratorio Energia e Ambiente Piacenza) and MatER (Materials and Energy from Refuse) Study Centre c/o Consorzio LEAP (Italy)

The radiative characteristics of NH3/N2/O2 non-premixed flame on a 10 kW test furnace
Ryuichi Murai, Ryohei Omori, Ryuki Kano, Yuji Tada, Hidetaka Higashino, Noriaki Nakatsuka, Jun Hayashi, Fumiteru Akamatsu, Kimio Iino and Yasuyuki Yamamoto
Osaka Univ. Dept. of Mechanical Engineering and Taiyo Nippon Sanso Co..Ltd. (Japan)

A kinetic study on simultaneously boosting the mass and fixed-carbon yield of charcoal production via atmospheric carbonization
Maria Zabalo Alonso, Khanh-Quang Tran, Liang Wang and Øyvind Skreiberg
Norwegian University of Science and Technology and SINTEF Energy Research (Norway)

Techno-economic assessment of integrated hydrochar and high-grade activated carbon production for electricity generation and storage
Rajesh Kempegowda, Khanh-Quang Tran and Øyvind Skreiberg
SINTEF Energy Research and Norwegian University of Science and Technology (Norway)

Refuse derived fuel from municipal solid waste rejected fractions- a Case Study
Isabel Brás, M. E. Silva, G. Lobo, A. Cordeiro, M. Faria and L. T. De Lemos
Escola Superior de Tecnologia e Gestão de Viseu, CI&DETS/ IPV and Ferrovial Serviços SA (Portugal)

Blast furnace gas based combustion systems in steel reheating furnaces
Víctor Cuervo Piñera, Diego Cifrián Riesgo, Phuc Danh Nguyen, Valerio Battaglia, Massimiliano Fantuzzi, Alessandro Della Rocca, Marco Ageno, Anders Rensgard, Chuan Wang, John Niska, Tomas Ekman, Carsten Rein and Wolfgang Adler
ArcelorMittal (Spain), Centro Sviluppo Materiali (Italy), Tenova (Italy), Swerea MEFOS (Sweden), AGA Linde (Sweden) and VDEh-Betriebsforschungsinstitut (Germany)

On-line alkali measurement during oxy-fuel combustion
Tomas Leffler, Magnus Berg, Christian Brackmann, Zhongshan Li and Marcus Aldén
R&D, Strategic Development and Lund University (Sweden)

13:15 – 14:30 **LUNCH**

14:30 – 17:20 **CHAIRMAN**
Joachim Wünning
WS Waermeprozesstechnik GmbH
GERMANY

14:30 – 15:20 **KEYNOTE LECTURE**

OXIDATION OF SOLID CARBON – WHAT WE KNOW AND WHAT WE NEED TO KNOW

Osvalda Senneca
Istituto di Ricerche sulla Combustione IRC-CNR
Italy

15:20 – 17:20 **ORAL SESSION: POLLUTION ASPECTS**

15:20 – 15:45 **Strategies and technologies towards zero emission biomass combustion by primary measures**

Ingwald Obernberger, Thomas Brunner, Christoph Mandl, Michael Kerschbaum and Thomas Svetlik
Bios BioEnergiesysteme GmbH and Windhager Zentralheizung Technik GmbH (Austria)

15:45 – 16:10 **NOX reduction using advanced techniques in a 175MWTH multi-fuel corner-fired boiler**

Michael Kryjak, James Dennis and Graeme Ridler
RJM Corporation (EC) Ltd (United Kingdom)

16:10 – 16:30 **COFFEE – BREAK**

16:30 – 16:55 **Experimental study of combustion process of gaseous fuels containing nitrogen compounds in new, low-emission Zonal Volumetric Combustion technology**

Rafał Ślefarskia, Dariusz Szewczyk, Radosław Jankowski and Michał Gołębiewski
ICS Industrial Combustion Systems Sp. and Poznan University of Technology (Poland)

16:55 – 17:20 **Behaviour of engineered nanoparticles in a lab-scale flame and combustion chamber**

Werner Baumann, Nadine Teuscher, Manuela Hauser, Hans-Joachim Gehrmann, Hanns-Rudolf Paur and Dieter Stapf
Karlsruhe Institute of Technology (Germany)

17:20 – 17:40 **CLOSING ADDRESS**

Neil Fricker
University of South Wales
United Kingdom

Viktor Scherer
Ruhr Universität Bochum
Germany

Albino Reis
Cenertec – Centro de Energia e Tecnologia
Portugal

19:00 **FAREWELL DINNER AT THE GRANDE REAL SANTA EULÁLIA RESORT & HOTEL SPA – RESTAURANTE SANTA EULÁLIA**