

Wednesday 13.11.202408:00 - 08:20 **Welcome & Introduction**08:20 - 09:00 **Keynote**Identification of combustion regimes of metal particles burning in atmospheric air
*Fabien Halter***Fundamentals of Iron Flames**

(Chair: Asst. Prof. Dr. Xiaocheng Mi)

09:00 - 09:20 Oxidation of spherical iron particles in a thermobalance and a fluidized bed reactor

A. Brillard, E. Shafirovich, C. Schönnenbeck, J.F. Brilhac, V. Tschamber

09:20 - 09:40 In situ XAS for mapping iron oxide phases in laminar iron dust flames of Bunsen-type

*L. Braun, F. P. Hagen, D. Doronkin, M. Fedoryk, M. Seitz, B. Stelzner, D. Trimis, J.-D. Grunwaldt*09:40 - 10:00 **Coffee Break**

10:00 - 10:20 Numerical analysis of nanoparticle dynamics and deposition in iron particle combustion

N. Hartmann, D. Maerker, T. D. Luu, A. Kronenburg, O. T. Stein

10:20 - 10:40 Toward 3-D Flow Field Resolved Numerical Simulations of Multiple Reacting Iron Particles

M. Ezra, O. Peles, Y. Kozak

10:40 - 10:50 Ignition and combustion characteristics of single iron particles in a novel drop-tube reactor

D. Ning, Y. Li, T. Li, B. Böhm, A. Dreizler

10:50 - 11:00 Using a v-shaped flame to determine burning velocity of iron powder

H.E. Prime, Y.L. Shoshyn, R.T.E. Hermanns, L.P.H. de Goey

11:00 - 11:10 An experimental study of morphological and dynamic effects on the ignition of single iron particles

M. Abdallah, G. Finotello, Y. Shoshin, L.P.H. De Goey

11:10 - 11:20 Effect of flame discreteness on the ignition and efficiency of turbulent iron flames

J. Hameete, X.C. Mi, T.A.M. Homan, N.J. Dam, L.P.H. de Goey

11:20 - 11:30 Experiments and Large Eddy Simulation of a 47 kWth swirl-stabilized methane-assisted iron dust flame

P. Steffens, J. Hebel, D. Braig, A. Vahl, L. L. Berkel, H. Schneider, H. Nicolai, A. Scholtissek, B. Böhm, A. Dreizler and C. Hasse

11:30 - 11:50 **Coffee Break**

MeCRE Feedstock Material Sourcing and Influence of Impurities

(Chair: Asst. Prof. Dr. Giulia Finotello)

11:50 - 12:10 Material Sourcing and Influence of Impurities: Iron(hydr)oxide residual from drinking water production: feasibility study on the potential as a source for iron powder production via H₂ reduction
L. de Waal, M. van Veggel, J. Muñoz Sierra, E. Cornelisse,

12:10 - 12:30 Material Sourcing and Influence of Impurities: Potential of New Zealand ironsand as dense energy carrier
C.J.M. Hessels, H.E. Prime, B. Maisuria, C.W. Bumby, R.T.E. Hermanns, L.P.H. de Goey

12:30 - 12:50 Material Sourcing and Influence of Impurities: Single-particle experimental combustion of impure iron particles: influence of Al and Mn impurities
Z. Bruyr, L. Hamad, L. Choisez, J. Hameete, P. Jacques, F. Halter, F. Contino

12:50 - 14:00 **Lunch (Welcome Hotel)**

14:00 - 14:40 **Keynote**
Safety and Logistics of Metal Powders
Ivo Dolk

Safety of Metal Fuels

(Chair: Dr.-Ing. Arne Scholtissek)

14:40 - 15:00 Experimental Investigation into the Explosion Properties of Direct Reduced Iron fines
A. Semenova, M. Hohenberger, H. Raupenschtrauch

15:00 - 15:20 Safety characteristics of different regenerated iron dusts
Stefan H. Spitzer, Nicole C. Stevens, Arne Krietsch, Roy T. E. Hermanns, Ekaterina Makarova, Ivan Lorenzon, Conrad J. M. Hessels

15:20 - 15:40 **Coffee Break**

Techno-Economic and Life Cycle Assessment

(Chair: Dr.-Ing. Arne Scholtissek)

15:40 - 16:00 Burning iron in retrofitted coal plants in Nova Scotia, Canada: life cycle emissions and techno-economic assessment
J. Otis-Laperrière, C. Liu, A. Côté, S. Jordaan, J. Berghthorson

16:00 - 16:20 Energy Carriers for the Global Energy Transition: Comparing Metals and Hydrogen Derivatives
J. Schuler, J. Neumann, A. Ardone, F. Dammel, P. Stephan, W. Fichtner

16:20 - 17:00 **Workshop**
Building a Metal Fuel Community
Raoul Voeten, Michael Davidson (metalot)

17:00 - 19:00 **Poster Session**

19:00 – 20:00 **Dinner (Welcome Hotel)**

Thursday 14.11.2024

08:00 - 08:40 **Keynote**
Decentralized Hydrogen Production using Low-Temperature Oxidation of Aluminum
Michel Haller

Non-Iron Metals as Future Energy Carriers

(Chair: Dr.-Ing. Fabian Sewerin)

08:40 - 09:00 Production of H₂ from Al-water reactions, evaluation of parameters for an Al-to-Energy prototype operation
M. Agote-Arán, B. Welte, R. Freeman, N. Mutti, M. Haller, J. Huppi, Y. Bäuerle and A. Heel

09:00- 09:20 In-situ microscopic study of the collision of a burning aluminium droplet with the alumina product
Z. Wu, C. Ruan, N. Jüngst, E. Berrocal, M. Aldén, Z. Li

09:20 – 09:40 Combustion of Single Aluminum Particles in Various Oxidizing Atmospheres
M.S. Mobarakeh, H. Chu, S. Bose, H. Pitsch, M.R. Kholghy

09:40 - 10:20 Coffee Break & Posters

10:20 - 10:40 A point-particle model for burning aluminum particles based on a reactive boundary layer in chemical equilibrium
F. Sewerin, H. Chu, J. Finke, H. Pitsch

10:40 - 11:00 Stabilization of silicon Bunsen flames on a laminar dust burner
H. Heng, E. Antar, C. Mani, K. Mangalvedhe, S. Goroshin, J. Bergthorson

Fundamentals and Technologies for Iron-Oxide Reduction

(Chair: Prof. Dr.-Ing. John Linkhorst)

11:00- 11:20 Direct reduction of iron ore using biomass biochar: rate of reduction, microstructural and morphological analysis
A. Fabozzi, F. Cerciello, O. Senneca

11:20 - 11:40 Hydrogen Plasma Smelting Reduction in Rotating Gliding Arc Discharges at Atmospheric Pressure
J.N. Figueiredo, B.B. Dally, D.A. Lacoste

11:40 - 12:00 The Impact of Redox Cycling on the Mechanistics of Iron Oxidation and Oxide Reduction – a Synchrotron-based in situ Mössbauer Study
J. Spielmann, L. Braun, D.E. Doronkin, I. Huck, J. Bao, C. Kuhn, O. Deutschmann, J.D. Grunwaldt, and U.I. Kramm

12:00 - 13:00 **Lunch (Welcome Hotel)**

13:00 - 13:40 **Keynote**
Supercritical Steam Combustion of Aluminum
Jeffrey Berghorson

Fundamentals and Technologies for Iron-Oxide Reduction

(Chair: Prof. Dr.-Ing. John Linkhorst)

13:40 - 14:00 Enhanced iron oxide powder reduction via fluidized bed operations across different regimes
N.C. Stevens, N.G. Deen, G. Finotello,

14:00 - 14:20 Conditions mapping for low temperature reduction of iron ore with hydrogen in a bubbling fluidized bed
V. Purnomo, D.C. Guío-Pérez, P. Knutsson, H. Leion, D. Pallarès

14:20 - 14:40 **Coffee Break**

14:40 - 15:00 An Electrochemical Slurry Reactor for Continuous Iron Oxide Reduction
J. Röblitz, F. Méndez Florido, J. Linkhorst

15:00 - 15:20 Low-Temperature Iron Electrolysis from Iron Oxide Suspensions in Alkaline solution
G. Ding, A.I. Majid, G. Finotello, J.v.d. Schaaf, N. Deen, Y. Tang

16:00 – 18:30 **Tour at UNESCO World Heritage Site Mathildenhöhe**

18:30 – End **Dinner at Braustüb'l**
Goebelstraße 7, 64293 Darmstadt

Friday 15.11.2024

08:10 – 09:00 **Keynote**
Energy Policy – The European Green Deal 2.0
Luca Giovannelli (European Commission, DG Research and Innovation)

09:00 – 09:20 **Coffee Break**

09:20 – 09:30 Industry Pitch
Team SOLID

09:30 – 09:40 Industry Pitch
RIFT

09:40 – 09:50 Industry Pitch
FENIX

09:50 – 10:00 Industry Pitch
IRON+

10:00 – 10:10 Industry Pitch
Swiss Nanomaterials

10:10 – 10:20 Community Pitch
metalot

10:20 - 10:40 Company Presentation
AMBARtec

Metal Fuels on an Industrial Scale

(Chair: Dr.-Ing. Roy Hermanns)

10:40 – 11:00 Modeling of a 90 MWth Commercial Fluidized Bed Plant Powered by Metal Fuel
F. Alobaid, J. Saari, E. Vakkilainen, J. Ritvanen, Y. Lichtmannegger, J. Ströhle, B. Epple

11:00 – 11:30 **Coffee Break & Networking**

11:30 – 11:50 150 kW Pilot Scale Combustion Experiments with Iron Powder
H. Wiinikka, A. Sepman

11:50 – 12:10 Fluidized bed combustion of iron within a zero-carbon energy storage-conversion cycle: numerical and experimental investigation
T. Wronski, A. Sciacovelli

12:10 – 12:30 Reduction and Oxidation of DLR of Iron Powder and Natural Iron Ore in a Lab-Scale Fluidized Bed Reactor
F. Marx, B. Johnen, J. Ströhle, B. Epple

12:30 – 12:40 Closing & Farewell
Christian Hasse, Andreas Dreizler