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**DEAR UNITECR PARTICIPANTS**

**DEAR FRIENDS OF THE REFRACTORY INDUSTRY**

This program provides you with an overview of everything that will be offered at the conference in Frankfurt from 26th to 29th September.

You will also find the schedule of the individual lectures here – with title, room, time and name of the speaker.

We have produced a separate Proceedings for the manuscripts of the lectures and posters in total.

With reference to your registration and consent to §IX Photographs, we point out that by registering and accepting the terms and conditions, you have already agreed that we may take photos and film recordings in order to use them for communication in the media afterwards.

## PROCEEDINGS

**Online access to the Proceedings**

The online access (QR-code and URL given here) is only available until 6th October 2023. As a registered participant you will also receive a link directly by email to download the Proceedings.

This link is protected via your username and password.


## WLAN

You have free access to WLAN on all congress days.
SPONSORS

We would like to thank the sponsors who made it possible to develop UNITECR 2023 into a very special event. Whether it’s important conference elements such as pens, pads or the conference bag, the events, the Welcome Evening or the Conference Dinner, all of this has been prepared even better for you with their support.

MEDIA PARTNERS

We would like to thank the media partners who helped us to publicize this UNITECR conference worldwide. With their support and also with the commitment in the social networks, UNITECR has grown into an outstanding event in 2023.
ORGANISATION
UNITECR 2023

HOST
Deutsche Feuerfest-Industrie e.V. (DFFI)
German Refractory Association

ORGANIZATIONAL OFFICE
European Centre for Refractories gGmbH (ECREF)
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Dr. Christian Dannert (Secretary Scientific UNITECR 2023)
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56203 Höhr-Grenzhausen | Germany
+49 2624 9433 125
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Osloer Str. 5
60327 Frankfurt am Main | Germany

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Prof. Dr. Christos G. Aneziris (UNITECR Vice President, Chairman of the Scientific Committee)

ORGANISATION TEAM
Prof. Dr. Christos G. Aneziris, Dr. Andus Buhr, Dr. Christian Dannert, Ulf Frohneberg, Dr. Rainer Gaebel, Thomas Kaczmarek

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Mila Brnovic
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SCIENTIFIC COMMITTEE
Chairman: Prof. Dr. Christos G. Aneziris

Raw Materials
Dr. Christoph Wöhrmeyer

Advances in Monolithic Technology
Prof. Dr. Olaf Krause

Refractories for Iron- and Steelmaking
Prof. Dr. Helge Jansen

Refractories for Non-Ferrous Metallurgy
Daniel Cölle

Refractories for Non-Metal Industries
Dr. Stefan Postrach

Modelling and Digitalization
Rinus Siebring

Education
Dr. Dietmar Gruber

Testing and Standardization
Dr. Christian Dannert

Basic Refractory Science and Technology Transfer
Prof. Dr. Dr. h.c. Peter Quirmbach
Your Refractory Technology Partner for the processes of tomorrow.
WELCOME ADDRESS

Dear member of the refractory family,

as Chairman of the German Refractory Association it is a great honour for me to welcome you in Frankfurt to the UNITECR 2023. We appreciate your initiative to join us in the beautiful Kap Europa for a unique conference. Welcome!

“The Carbon Challenge” is the motto of this international conference. The motto represents the role of the refractory producers in the global transformation of the industry towards CO2-neutral production of steel, glass, cement, non-ferrous metals, chemicals and many other products. This transformation under competitive conditions, which is indeed a major challenge for all stakeholders, be it from business, industry or society, is only possible with the help of refractory products. Without refractory products, there will be no wind power plants, no photovoltaic plants, no DRI, no hydrogen. The refractory industry is a necessary technology partner of the whole industry and stands ready with all its know-how to help, shape and develop the processes of the future.

UNITECR 2023 offers an excellent platform of exchange for you experts from the worldwide refractory industry together with professionals from the user industries. Over the three days, more than 250 technical papers will be presented, framed by a large poster show and a trade exhibition. The welcome reception on the eve of the conference, as well as the conference dinner Thursday will provide you a fantastic atmosphere for networking.

However, the transformation of the industry also offers the refractory industry another great opportunity, namely that of an image change towards a system-relevant high-tech industry. We, the refractory industry, should use this opportunity to increase our perception in politics and society with a broad chest on the one hand, and at the same time to increase our attractiveness as employers in a sustainable high tech industry that is crucial for the transformation towards a greener world.

I am looking forward to meet fellow members of the refractory family and to make new friends on the largest technical colloquium the global refractory industry has to offer.

I wish you fruitful meetings and new insights.

Glückauf!

Yours

Ulf Frohneberg
Host UNITECR 2023

German Refractory Association
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WELCOME TO THE CARBON CHALLENGE

“The Carbon Challenge: steps and leaps to master the future” is our motto at the UNITECR over the three days in Frankfurt – and for the coming years as we drive forward the transformation of our industry.

Refractories are an important tool for the energy intensive high temperature industries who strive towards reduced CO₂ emission and achieving carbon-neutrality in the not too distant future. At UNITECR, experts, researchers and professionals from all over the world come together to expand knowledge and find solutions to the challenges facing the industries.

Steps or incremental improvements of refractory materials and lining concepts enable lower heat losses in processes. This aspect is gaining increasing momentum in the industry. Disruptive technology changes such as carbon-neutral steel production and the replacement of fossil fuels in high temperature processes require leaps in refractories and lining concept development. Both, steps and leaps are addressed in our technical program.

An important part is the recycling economy to conserve limited resources and reduce the ecological footprint in the refractory industry. Regional value chains with close cooperation between suppliers, users and other stakeholders involved are essential. There are good examples of this already taking place.

Modern tools such as big data analysis, machine learning, and the development of suitable models help to increase the speed of innovation in our industry. We have examples in our program. The job of a refractory engineer offers interesting challenges for young talent, men and women. It provides meaningful work by contributing to new technologies enabling reductions in CO₂ emission.

There will be a leap in knowledge after this conference, which will be of enormous importance to all of us. We hope that you will experience inspiring presentations, exciting discussions and valuable networking opportunities during the conference. The UNITECR conference is known for its high-profile speakers and poster sessions. New are five panel debates on special topics that we have developed especially for this conference. Experience the exchange of opinions live and join the discussion!

Use this opportunity to expand your knowledge, exchange ideas with colleagues from the industry and discover new cooperation opportunities! We are confident that this conference will provide you with valuable insights and ideas for your work and research.

Prof. Dr. Christos G. Aneziris, as Vice President of UNITECR 2023 and Chairman of the Scientific Committee, and his team have ensured high quality and diversity. The conference program and the poster exhibition were compiled from over 330 submissions.

We both look forward to seeing you. Once again, welcome to the UNITECR 2023. We wish you an inspiring and successful event!

We would like to thank all speakers, chairmen, participants, exhibitors and organisers who have contributed to this event.

Dr. Andus Buhr
President UNITECR 2023
OUR OPERATING TEMPERATURE?

HOT AS HELL.

THE INTOCAST GROUP OF EXPERTS

www.intocast.com
THE STORY OF UNITECR 2023

UNITECR has been formed as a joint effort to organise unified technical conferences on refractories in 1989. Since then, biannual conferences have circled the world between the countries of the four founding members of UNITECR: North America (founding member: American Ceramic Society, ACerS), Europe (founding member: Deutsche Feuerfest-Industrie, DFFI), South America (founding member: ALAFAR) and Japan (founding member: Technical Association of Refractories Japan, TARJ). We are now in the fifth iteration of that circle, with this year’s UNITECR organised by the European founding member DFFI in Frankfurt. Welcome!

The previous UNITECR in Chicago in 2022 marked the first public presentation for this year’s event, introducing Frankfurt as the venue with a short film during the dinner. While the two designated Frankfurt event venues, Kap Europa and the Palmengarten, had long been reserved, it was now a matter of invigorating the 2023 topic “The Carbon Challenge” and promoting it worldwide.

The “Call for Paper” for scientific contributions in March 2022 attracted over 330 submissions by December 2022. Over the Christmas period, the Scientific Committee evaluated the submissions and created the structure of the scientific conference, assigning the submissions to the nine session topics of UNITECR 2023. 219 speakers were initially invited and asked to present their research during UNITECR. They also outlined their work in scientific papers, which we have published in the Proceedings that you can download via a QR code or URL (see page 1) and in a Special Issue of the scientific journal “Open Ceramics”. The scientific lectures will be interspersed with panel discussions, in which invited experts will discuss with the audience topics of special interest to the headline of UNITECR 2023, “The Carbon Challenge”.

In addition to the scientific lectures, a large number of researchers have been invited to prominently display their work on posters which are shown in a prominent position at the venue during the whole event. In a novel format of a poster SLAM (see page 30) they will also have the opportunity to present their work to an expert audience as a short pitch, with the best three short presentations honoured with a poster AWARD (see page 35).

Events such as Young Professionals, Women@Refractories and the presentation of the 2023 Gustav Eirich Award will run in parallel and as part of the conference. Furthermore, and also parallel to the conference, an accompanying industry exhibition will take place on all floors of the venue. It is our pleasure to welcome these companies, which offer tailored products and services to the refractory industry.

Media partners are an active partner in UNITECR, spreading the news about the event sustainably in the social networks. Many thanks for this.

We would like to take this opportunity to thank our sponsors. They made it possible for the one or other event to be even more tailored to you as participants.

When we have waved goodbye to the last of our guests on Friday afternoon, we hope that you will take with you fond memories of UNITECR 2023.

We wish you a few fantastic UNITECR days.

Thomas Kaczmarek
Secretary General
UNITECR 2023

Dr. Christian Dannert
Secretary Scientific
UNITECR 2023
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- Cellulose Powder
- Cryolite (Na, K)
- Fluorides (Al, Ba, K, Li, Mg, Na, Sr...)
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SCHEDULE AT A GLANCE

TUESDAY
WELCOME EVENING

WEDNESDAY
GRAND OPENING
• Customers: Dr. Marie Jaroni (thyssenkrupp Steel Europe)
• Science and Media: Ranga Yogeshwar (science journalist)
• Politics: Parliamentary State Secretary Michael Kellner (German Federal Ministry of Economic Affairs and Climate Action)

POSTERS
SLAM – AWARD – WALK
EXHIBITION (Wednesday–Friday)

WOMEN@REFRACTORIES
Glass ceiling or sticky floor? Get leadership inspiration, connect and exchange with the female force of the refractory industry.

SCIENTIFIC PROGRAM
17 sessions & 2 panel discussions

THURSDAY
GUSTAV EIRICH AWARD
Prizegiving for the three best dissertations (Ph.D. theses) in the field of refractories.

YOUNG PROFESSIONALS
Invitation of participating students to exchange ideas on the latest developments about virtual reality and receive an invitation to the Conference Dinner in the Palmengarten.

CONFERENCE DINNER
• Appointment of the Distinguished Life Members 2023
• Presentation of the upcoming UNITECR 2025

SCIENTIFIC PROGRAM
30 sessions & 3 panel discussions

FRIDAY
SCIENTIFIC PROGRAM
12 sessions
We are the driving force of the refractory industry.
WELCOME EVENING
SPONSORED BY RHI MAGNESITA

TUESDAY 26TH SEPTEMBER
06.00 PM – 11.00 PM, Room Horizont

After eight years, UNITECR returns to Germany. On the evening before the conference, the focus will be on reuniting and networking. Not least because of the worldwide COVID-19 pandemic, all participants are looking forward to this welcome evening to meet colleagues from their professional life and also friends again face to face.

The doors at Kap Europa will be open from 05.00 PM.

SCHEDULE
06.00 PM  WELCOME ADDRESS

• UNITECR President 2023  Dr. Andus Buhr
• UNITECR Vice President  Prof. Dr. Christos G. Aneziris
Honouring of the Scientific Committee
• Event Sponsor  RHI MAGNESITA | Constantin Beelitz
  Regional President Europe, CIS & Türkiye

AWARD OF FIRE DIPLOMA FOR THE RECENT COHORT OF STUDENTS
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Federation for International Refractory Research and Education (FIRE)
Chairman: Chris Parr

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GRAND OPENING - KEYNOTES

WEDNESDAY, 27TH SEPTEMBER
10.00 AM – 12.10 AM, Room Horizont

With our lead topic The Carbon Challenge we have defined three pillars for the UNITECR opening: political framework and customer orientation as well as resilience and sustainability.

We are glad to have Dr. Marie Jaroni representing a major customer industry with her keynote. Leading the team “Decarbonization and Sustainability” at thyssenkrupp Steel she will explain how six million tons of CO₂ can be avoided by thyssenkrupp annually by 2030.

Moreover it was possible to win Ranga Yogeshwar for a keynote. With a degree in particle physics Ranga created and hosted numerous television programs and has received more than 60 awards, including honorary doctorates from the universities of Koblenz-Landau and Wuppertal as well as an honorary professorship from Bonn-Rhein-Sieg University of Applied Sciences. Today he is one of the leading independent science journalists and key-note speakers in Germany.

Parliamentary State Secretary Michael Kellner from the German Federal Ministry of Economic Affairs and Climate Action will give a political perception on our lead topic via video.

10.00 AM – 10.15 AM
Ulf Frohneberg (STEULER)
Chairman of the Board Deutsche Feuerfest-Industrie (DFII)
Global Decarbonization – Opportunities for the Refractory Industry

10.15 AM – 10.30 AM
Dr. Andus Buhr (ALMATIS)
President UNITECR 2023
The Carbon Challenge

10.30 AM – 11.15 AM
Dr. Marie Jaroni (thyssenkrupp Steel Europe)
Head Of Decarbonization and Sustainability
Steel industry on the way to a decarbonized future: opportunities and challenges of the green transformation

11.15 AM – 12.00 AM
Ranga Yogeshwar
Science Journalist / Physicist
Emil’s World – A Society in Transition
About the urgent need of a deeper culture-shift and what it means to grow up surrounded with talking devices, artificial intelligence and changing social interactions.

12.00 AM – 12.10 AM
Michael Kellner (German Federal Ministry of Economic Affairs and Climate Action)
Parliamentary State Secretary
Take refractory technology to the next level.

How can refractory technology contribute to the necessary transformation? Tomorrow’s professionals can find answers and our «REFRAup» young professionals program is set to shed light on new and young perspectives for reaching the next level of refractory technology.

www.refra.com
CONFERENCE DINNER
SPONSORED BY REFRATECHNIK

THURSDAY 28TH SEPTEMBER
06.30 PM – 00.00 PM, Gesellschaftshaus Palmengarten
Palmengartenstraße 11, 60325 Frankfurt am Main

On Thursday, a very special dinner will take place in Frankfurts Palmengarten. A fantastic location, with excellent food, delicious drinks and a music program worth hearing guarantee a lasting impression for all participants. It is not held as a well seated Gala Dinner but rather as a dynamic meet and greet, so that there is the opportunity to maintain contacts and make new ones at many tables.

After a casual reception with an aperitif on the terrace, the historic ballroom with its magnificent ornaments from the Neo-Renaissance invites you to linger. Besides impressions of the congress day and the official welcome of the UNITECR hosts, a creative buffet with regional and seasonal delicacies awaits you.

The special setting in this building is underlined by the award of the UNITECR certificates to the three nominated Distinguished Life Members (DLM). A second highlight is the presentation of the next UNITECR location for the year 2025.

The Conference Dinner is always a main highlight at UNITECR events – in addition to the scientific lectures, of course. Here, too, is room for debate about what has been heard so far. Speakers, poster exhibitors and guests can engage in discussions with each other.

From 09.00 PM., as an exclusive highlight, the legendary Palm House Terrace will be available for dancing. Surrounded by beautiful Wilhelminian time plant stands and to the sounds and tunes of a Frankfurt scene DJ, the evening guarantees a very good mood.

The doors of the Palmengarten will be open from 06.30 PM.

SCHEDULE

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<td>Opening Palmengarten</td>
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<td>07.15 PM</td>
<td>Opening Address</td>
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<td></td>
<td>Dr. Rainer Gaebel</td>
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<td>Managing Director Refratechnik Holding</td>
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<td>Event Sponsor</td>
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<td>Words of Welcome</td>
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<td>Dr Andus Buhr, UNITECR President 2023</td>
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<td>Certificates to DLM</td>
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<td>Dr. Andus Buhr</td>
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<td>Tom Vert, UNITECR President 2022</td>
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<td>Genaro F. Cueva, UNITECR President 2025</td>
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<td>Invitation to UNITECR 2025</td>
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<td>Genaro F. Cueva</td>
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MUSIC

SWING TO GO and DJ

Sponsor: REFRATECHNIK
FLOOR PLAN

LEVEL 1

LEVEL 2
FLOOR PLAN

LEVEL 3

LEVEL 4
WEDNESDAY
27TH SEPTEMBER

» QUICK TIPS

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  Transformation Steel Industry II: Hydrogen Resistance of Refractories  30

POSTER SLAM  30
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<tr>
<td>01.00 PM</td>
<td>LCA of Refractories / Hydrogen I</td>
<td>Ironmaking I</td>
<td>Testing and Standardization I</td>
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<td>01.00 PM – 02.40 PM</td>
<td>01.00 PM – 02.20 PM</td>
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<td>03.00 PM</td>
<td>Modelling in Industrial Refractory Practice</td>
<td>Ironmaking II</td>
<td>Testing and Standardization II</td>
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## SCHEDULE WEDNESDAY 27TH SEPTEMBER

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<td>01.00 PM</td>
<td>MONOLITHIC REFRACTORIES I 01.00 PM – 02.40 PM</td>
<td>RAW MATERIALS – BASIC MATERIALS 01.00 PM – 02.40 PM</td>
<td>PRIMARY METALLURGY I 01.00 PM – 02.00 PM</td>
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<td>PANEL DISCUSSION – TRANSFORMATION STEEL INDUSTRY I: SMELTING OF DRI 02.00 PM – 02.40 PM</td>
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<tr>
<td>03.00 PM</td>
<td>MONOLITHIC REFRACTORIES II 03.00 PM – 04.00 PM</td>
<td>RAW MATERIALS – BINDERS I 03.00 PM – 04.00 PM</td>
<td>HYDROGEN II 03.00 PM – 03.40 PM</td>
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<td>PANEL DISCUSSION – TRANSFORMATION OF THE STEEL INDUSTRY II: HYDROGEN RESISTANCE OF REFRACTORIES 03.40 PM – 04.20 PM</td>
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<td>MONOLITHIC REFRACTORIES III 04.40 PM – 05.40 PM</td>
<td>RAW MATERIALS – BINDERS II / SECONDARY MATERIALS I 04.40 PM – 06.00 PM</td>
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WEDNESDAY 27TH SEPTEMBER

GRAND OPENING

📍 HORIZONT
⏰ 10.00 AM – 12.00 AM

LCA OF REFRACTORIES / HYDROGEN I
Chairs: Dannert, C., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); Léonard, A., University of Liége (Liége, BE)

📍 PLATEAU 1
⏰ 01.00 PM – 02.40 PM

01.00 PM  Life cycle environmental and cost assessment of ladle refractories management according to circular economy criteria
Muñoz, I., 2–0 LCA consultants (Barcelona, ES)

01.20 PM  Insulating Refractories as an Enabler to Carbon Sustainability, Demonstrated through Life Cycle Assessment.
Mottram, R., Morgan Advanced Materials (Bromborough, GB)

01.40 PM  Overview on LCA: challenges and opportunities for the refractory industry
Menezes Cunha, J., RHI Magnesita GmbH (Leoben, AT)

02.00 PM  Refractory innovations under the target of carbon dioxide peaking and carbon neutrality in China
Li, H., Sinosteel Luoyang Institute of Refractories Research Co., Ltd. (Luoyang, CN)

02.20 PM  Hydrogen: an issue and a new challenge for the durability of refractories
Poirier, J., University of Orleans (Orleans, FR)

IRONMAKING I
Chairs: Schepers, A., Beck u. Kalthueuer Feuerfeste Erzeugnisse GmbH & Co. KG (Plettenberg, DE); Sinha, S., Calderys India Refractories Ltd (Nagpur, IN)

📍 PLATEAU 2
⏰ 01.00 PM – 02.20 PM

01.00 PM  End of petroleum tar binder, new generation of tap-hole clay. Formaldehyde and PAH free technology
Joly, T., Vesuvius Europe (Décines, FR)

01.20 PM  Comparative study between coal tar pitch and lower polycyclic aromatic hydrocarbon (PAH) alternative binders for use in taphole clays
Cameron, I., University of Pretoria (Pretoria, ZA)

01.40 PM  Development of High Performance Tap Hole Clay
Patranabish, T., Calderys (Nagpur, IN)

02.00 PM  Behavior of carbon-based binders for blast furnace taphole clays focused on environment, safety, and performance
Oliveira, T., Universidade Federal de Minas Gerais (Belo Horizonte, BR)

JOIN US AT THE POSTER SLAM
Researchers and scientists will present the main features of their work in one minute.

PAGE 30

Sponsored by STEULER & refractories WORLDFORUM
WEDNESDAY 27TH SEPTEMBER

TESTING AND STANDARDIZATION I
Chairs: Krause, O., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE); Abdelouhab, S., Belgian Ceramic Research Centre (Mons, BE)

📍 MISTRAL
🕒 01.00 PM – 02.40 PM

01.00 PM In situ high-temperature Raman spectroscopy: A powerful tool for studying refractory materials
Zimmer, S., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

01.20 PM Material characterization & product analysis of refractories via X-ray computed tomography
Lüftner, D., RHI Magnesita GmbH (Leoben, AT)

01.40 PM Fracture energy determination of carbon-containing refractories with consideration of the creep behaviour
Gruber, D., Montanuniversität Leoben (Leoben, AT)

02.00 PM Investigation of the simultaneous influence of mechanical loading and thermal gradient as occurring in refractory linings on the refractory microstructure and physical properties
Brochen, E., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE)

02.20 PM Application of Ultra–High Speed Heating Test System – Evaluation of Thermal Conductivity –
Nakabo, K., Okayama Ceramics Research Foundation (Okayama, JP)
**WEDNESDAY 27TH SEPTEMBER**

**MONOLITHIC REFRACTORIES I**
Chairs: Angelkort, J., Intocast AG (Krefeld, DE); Peng, H., Elkem Silicon Products Development (Kristiansand, NO)

📍 MERIDIAN 1
⏰ 01.00 PM – 02.40 PM

01.00 PM  **Novel colloidal silica technology for MgO-containing refractories – Part 1: Anti-hydroxylation binder**
Salomão, R., University of São Paulo (São Carlos, BR)

01.20 PM  **Investigating the MgO castable’s hydration mechanism by hydratable alumina substitution for calcium aluminate cement, and phase formation at high temperature using nano-MgAl₂O₄ additives**
Nourbakhsh, A., Arvin Dirgodaz Vijeh Co (Isfahan, IR); Davoudian, R., Arvin Dirgodaz Vijeh Co (Isfahan, IR)

01.40 PM  **Novel colloidal silica technology for MgO-containing refractories – Part 2: “In situ” spinelization**
Salomão, R., University of São Paulo (São Carlos, BR)

02.00 PM  **The in-situ spinel formation in a magnesia alumina castable and the effect of selected additives on the properties of the castable**
Angelkort, J., Intocast AG (Krefeld, DE)

02.20 PM  **A novel approach to develop sustainable cement-free magnesia castables**
Peng, H., Elkem Silicon Products Development (Kristiansand, NO)

**RAW MATERIALS – BASIC MATERIALS**
Chairs: Prietl, T., RHI Magnesita (Vienna, AT); Li, Y., Wuhan University of Science and Technology (Wuhan, CN)

📍 MERIDIAN 2
⏰ 01.00 PM – 02.40 PM

01.00 PM  **From lab to plant – from mine to refractory bricks: Making use of a new dolomite raw material source in Europe**
Ebner, C., RHI Magnesita GmbH (Leoben, AT)

01.20 PM  **Designing eco-friendly alternative to the magnesia-chromite aggregates**
Borges, O., Federal University of São Carlos (São Carlos, BR)

01.40 PM  **Development of novel DBM portfolio for Steel, Cement and Glass Refractories**
Naves Moraes, M., RHI Magnesita (Belo Horizonte, BR)

02.00 PM  **An Approach to Purify Natural Magnesite and to Densify Sintered Magnesia**
Guo, Z., Liaoqing Fenghua Industrial Corporation (Yingkou, CN)

02.20 PM  **Enhanced performance of free CaO impurity containing magnesia with Al₂O₃–TiO₂ composite powder**
Xu, Y., Wuhan University of Science and Technology (Wuhan, CN)
**WEDNESDAY 27TH SEPTEMBER**

**PRIMARY METALLURGY I**
Chairs: Mertke, A., Salzgitter Flachstahl GmbH (Salzgitter, DE); Vert, T., Strategic Refractory Consulting Inc (Hamilton, CA)

**HORIZONT**
⏰ 01.00 PM – 02.00 PM

01.00 PM  **New Ways To Destroy Refractories – the Future of Green Steelmaking!**
Vert, T., Strategic Refractory Consulting Inc (Hamilton, CA)

01.20 PM  **Transformation to hydrogen-based steel making and refractory challenges at thyssenkrupp Steel Europe AG in Duisburg**
Weinberg, M., thyssenkrupp Steel Europe (Duisburg, DE)

01.40 PM  **Decarbonisation of Steel Industry and its Impact on future slag**
Volkova, O., TU Bergakademie Freiberg (Freiberg, DE)

**PANEL DISCUSSION – TRANSFORMATION OF THE STEEL INDUSTRY I: SMELTING OF DRI**
Moderation: Mertke, A., Salzgitter Flachstahl GmbH (Salzgitter, DE)

Weinberg, M., thyssenkrupp Steel Europe (Duisburg, DE); Jansen, H., Refratechnik (Düsseldorf, DE); Moulin-Silva, W., RHI Magnesita (Vienna, AT); Louw, S., Metix-SMS (Sandton, ZA); Volkova, O., TU Bergakademie Freiberg (Freiberg, DE); Garbers-Craig, A., University of Pretoria (Pretoria, ZA); Algermissen, D., FEhS-Institut für Baustoff-Forschung (Duisburg, DE)

**HORIZONT**
⏰ 02.00 PM – 02.40 PM

Smelting of direct reduced iron (DRI) has specific implications for the refractory lining of the electric arc furnaces because the DRI still contains all the gangue from the iron ore. When taking into account that regular DRI pellets have gangue content of up to 10%, a large amount of slag is created during the smelting process. This slag is rather acidic. An acidic slag composition is required for making use of it as alternative to blast furnace cement. It is a very interesting question how the existing basic refractory lining concepts for electric arc furnaces and submerged arc furnaces (or open bath furnaces) may change due to the new process conditions. An international group of experts from the steel and refractory industries, OEM, and research institutions will discuss this in a panel at UNITECR.
**WEDNESDAY 27TH SEPTEMBER**

**MODELLING IN INDUSTRIAL REFRACTORY PRACTICE**
Chairs: Gruber, D., Montanuniversität Leoben (Leoben, AT); Huger, M., IRCER, University of Limoges (Limoges, FR)

**PLATEAU 1**
03.00 PM  A coupled thermo–chemo–mechanical approach to simulate the oxidation of SiC–based refractory castable  
Sayet, J., Univ. Orléans, LaMé (EA7494, Univ. Orléans, Univ. Tours, INSA CVL) (Orléans, FR)

03.20 PM  Thermodynamics of interfaces in the refining of clean steels and its importance to the design of ceramic plugs  
Falsetti, L., Federal University of Sao Carlos (São Carlos, BR)

03.40 PM  Thermodynamic simulation of slag–refractory–interactions in different metallurgical systems  
Heikkinen, E., University of Oulu (Oulu, FI)

**IRONMAKING II**
Chairs: Hennemann-Hohenfried, E., Refratechnik Steel GmbH (Bendorf, DE); Clasen, S., PAHAGE Feuerfeste Erzeugnisse GmbH & Co. KG (Viersen, DE)

**PLATEAU 2**
03.00 PM  Improvement of Al₂O₃–SiC–C Bricks of the Hot Metal Ladle  
Hashimoto, K., Nippon Steel Corporation (Aichi Pref., JP)

03.20 PM  Improvement in torpedo ladle refractory corrosion rate by mist cooling  
Taniguchi, K., JFE Steel Corporation (Chiba, JP)

03.40 PM  Self-healing microstructure: the utmost refractory toughness mechanism  
Sako, E., Shinagawa Refractories Co., Ltd. (Vinhedo, BR)

04.00 PM  Recycling of Al₂O₃–SiC–C Refractory Brick for Repairing Torpedo Ladle Car  
Kim, S., Hyundai steel (Chungnam, KR)
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TESTING AND STANDARDIZATION II
Chairs: Klischat, H., World Refractories Association (Brussels, BE); Miranda, M., World Refractories Association (Brussels, BE)

MISTRAL
03.00 PM – 04.20 PM

03.00 PM European and International Standardization Work in Refractories
Baensch, F., Deutsches Institut für Normung (Berlin, DE)

03.20 PM Young’s Modulus of Refractories at High Temperatures: Comparison of different Testing Methods as Base for Masonry Modelling
Tonnesen, T., RWTH Aachen University (Aachen, DE)

03.40 PM Statistical Evaluation of influencing factors on various cold crushing strength determination methods
Urbanek, G., RHI Magnesita (Leoben, AT)

04.00 PM Evaluation of cold crushing strength methods on statistical values of various refractory brick grades
Klischat, H., World Refractories Association (Brussels, BE)

RAW MATERIALS – BINDERS I
Chairs: Kasper, J., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE); Schneider, N., Bakelite Synthetics (Iserlohn, DE)

MERIDIAN 2
03.00 PM – 04.00 PM

03.00 PM Refractory cements containing Zr and Sr as alternatives to the CACs designed for the production of high performance monolithic refractories
Madej, D., AGH University of Science and Technology (Krakow, PL)

03.20 PM A new approach to achieve robust and easy to use NCC
Lacoue, F., IMERYS (Paris, FR)

03.40 PM What is really in there? Classification of aromatic compounds in carbon-based refractory bonds by high-resolution mass spectrometry and multivariate statistics
Masoudi Alavi, A., University of Koblenz (Koblenz, DE)

HYDROGEN II
Chairs: Sax, A., University of Koblenz (Koblenz, DE); Walls, P., Hitech Materials Pty Ltd (Figtree, AU)

HORIZONT
03.00 PM – 03.40 PM

03.00 PM Status and challenges of hydrogen containing fuels on porous ceramic materials and protective systems in the energy industry
Anton, R., Siemens Energy (Mülheim an der Ruhr, DE)

03.20 PM H2Change: Refractories under attack of challenging atmospheres during transformation process
Sperber, J., STEULER-KCH GmbH (Höhr-Grenzhausen, DE)
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PANEL DISCUSSION – TRANSFORMATION OF THE STEEL INDUSTRY II: HYDROGEN RESISTANCE OF REFRACTORIES
Moderation: Tonnesen, T., RWTH Aachen University (Aachen, DE)
Kohnen, B., thyssenkrupp (Duisburg, DE); Anton, R., Siemens Energy (Berlin, DE); Sperber, J., Steuler Linings (Höhr-Grenzhausen, DE); Gavagnin, D., RHI Magnesita (Vienna, AT); Walls, P., Hitech Materials (Figtree, AUS); Li, H., Bao Steel Institute Luoyang (Luoyang, CN); Sax, A., University of Koblenz (Koblenz, DE)

HORIZONT
03.40 PM – 04.20 PM

Hydrogen will replace fossil fuels on the industry’s path towards carbon neutrality. It will be used as fuel, but also as reducing agent such as in direct reduced iron production. It is well known that hydrogen can attack refractories and destroy them over time, and which refractories are more or less prone to such attack. However, process conditions in new processes using hydrogen can differ from existing ones and research and testing are required in order to achieve the desired life time of refractories. An international group of experts from industry and research institutes will discuss this in a panel at UNITECR.

MONOLITHIC REFRACTORIES II
Chairs: Holleyn, F., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE); Abdelouhab, S., Belgian Ceramic Research Centre (Mons, BE)

MERIDIAN 1
03.00 PM – 04.00 PM

03.00 PM  Dry high-performance materials in the change of time
Damjanović, B., EKW–Kremen d.o.o. (Šentjernej, SI)

03.20 PM  Hydrates regulation of CAC and their effects on high temperature properties of alumina–spinel castables
Liao, N., Wuhan University of Science and Technology (Wuhan, CN)

03.40 PM  Use of Novel Refractory Design and Installation Techniques for Improved Energy Efficiency in Iron and Steel and Other Energy Intensive Industries
Hemrick, J., Oak Ridge National Laboratory (Oak Ridge, US)

POSTER SLAM
Chair: Aneziris, C. G., Technische Universität Bergakademie Freiberg (Freiberg, DE)

PLATEAU 1
04.40 PM – 05.15 PM

04.40 PM  Estimation of refractory castable thermal conductivity: a manufacturer’s perspective
Chang, C., China Ecotek Corporation (Kaohsiung, TW)

04.41 PM  Analysis of corrosion mechanisms of non–cement and low–cement alumina–magnesia gunning mix with special calcined alumina in rotary slag test
Lee, Y., Hsin Lian Hsin Enterprise Co. Ltd. (Kaohsiung, TW)
WEDNESDAY  27TH SEPTEMBER

04.42 PM  Ceramic foam filters with a carbon–bonded alumina coating for aluminum melt filtration
Voigt, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

04.43 PM  Formation of isolation layer between the refractory lining and molten steel/slag: industrial trials in refining ladle
Chen, J., Wuhan University of Science and Technology (Wuhan, CN)

04.44 PM  Refractory Handling Manipulator for safe & better ergonomics
Ali, S., TRL Krosaki Refractories Ltd. (Belpahar, IN)

04.45 PM  Improvement of thermo–mechanical properties of direct bonded magnesia chrome refractories for RH Degasser
Ghosh, B., TRL Krosaki Refractories Ltd. (Belpahar, IN)

04.46 PM  Performance improvement of steel ladle MgO–C refractories by using novel carbon additives
Ghosh, B., TRL Krosaki Refractories Ltd. (Belpahar, IN)

04.47 PM  Effect of firing temperature on thermo–mechanical properties of Low Cement Castables
Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

04.48 PM  Influence of Pitch Type on Properties of Blast Furnace Trough Castable
Kanagawa, T., SHINAGAWA REFRACTORIES CO.,LTD (Okayama, JP)

04.49 PM  Understanding how the binder system influences the properties and process performance indicators of taphole clays
Cameron, I., University of Pretoria (Pretoria, ZA)

04.50 PM  Modifications in Ladle Slide Gate System for improving Safety & Productivity
Ali, S., TRL Krosaki Refractories Ltd. (Belpahar, IN)

04.51 PM  Performance of Novel Silica Dry Vibrating Refractory Lining Mixes without pure Boric Acid or Boron Oxide in Crucible Induction Furnaces in the Iron Foundries
Atanga, V., Dörentrup Feuerfestprodukte GmbH & Co. KG (Dörentrup, DE)

04.52 PM  Transmission conditions across a thin Thermoelastic interphase
Pande, S., University of Trento (Trento, IT)

04.53 PM  Alumina/aluminum titanate based model refractory material: a promising microstructural design to enhance thermal shock resistance
Mouiya, M., Département Science des Matériaux, Energie et Nano-ingénierie, Université Mohammed VI Polytechnique (UM6P) & Institut de Recherche sur les Céramiques (IRCER), Université de Limoges (Limoges, FR)

04.54 PM  Microstructure Design of a more Sustainable Alumina-spinel Refractory Castable
Boateng, K., Imerys S.A. (Vaulx Milieu, FR)

04.55 PM  Discrete Element Method (DEM) to support microstructure design of refractories
Ranganathan, H., Imerys Technology Center (Vaulx Milieu, FR)

04.56 PM  Hydrogen induced attack of Al₂O₃–SiO₂ refractories – application of SEM techniques and thermodynamics
Henn, I., University of Koblenz (Koblenz, DE)

04.57 PM  Study on Chrome–free purging plug for steel ladles
Klaus, S., Almatis GmbH (Frankfurt, DE)
**WEDNESDAY 27TH SEPTEMBER**

04.58 PM  **Online repairing of Blast furnace trough to enhance hot metal throughput**
Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

04.59 PM  **Design of Self-Flow castable using SioxX (TM) –Flow and its ageing analysis in tropical condition**
Mishra, A., Elkem South Asia Pvt. Ltd. (Nagapur, IN)

05.00 PM  **Microstructural evolution and corrosion behavior of rebounded magnesia–chromite refractories used in steelmaking RH furnaces**
Bavand-Vandchali, M., Almas Alborz Refractories Co (Tehran, IR)

05.01 PM  **Development of a novel thermal shock protocol of experiment of carbon–based refractory materials**
Anhour, K., VESUVIUS, Trento University (Mons, BE)

05.02 PM  **Advanced analytics applied to improve the energy efficiency of steel ladle logistics**
Ruela, V., Tata Steel, TU Wien (Uitgeest, NL)

05.03 PM  **Carbon bonded rods for measurement of molten steel velocity at the meniscus level in the continuous caster mould: from the lab to the plant trials**
Luchini, B., Tata Steel Nederland (Velsen-Noord, NL)

05.04 PM  **Approaches to solving advanced problems of established refractory designs in non-ferrous metallurgy**
Vezzuli, A., EKW Italia S.R.L. (Concorezzo, IT)

05.05 PM  **Refractory composite aggregates based on Nb–Al₂O₃ using 3D printing technology**
Zienert, T., TU Bergakademie Freiberg (Freiberg, DE)

05.06 PM  **The choice of magnesia–carbon refractories for steel ladle lining: a life cycle perspective**
Md Jubayed, University of Liege (Liege, BE)

05.07 PM  **Characterization of refractories with regard to the application in H₂-containing atmospheres**
Bohorquez-Moreno, C., TataSteel, Montanuniversitat Leoben, (Velsen Noord, NL)

The jury will evaluate the 3 best presentations in terms of their successful short presentation. After a round of evaluation, the AWARD ceremony will take place at 6.00 PM.

The poster WALK will start directly after the AWARD ceremony. Refreshments and pretzel snacks will be served during the tour of the poster exhibition.
WEDNESDAY  27TH SEPTEMBER

IRONMAKING III
Chairs: Dey, R., Carborundum Universal Limited (Chennai, IN); Lemkamp, L., Hüttenwerke Krupp Mannesmann GmbH (Duisburg, DE)

📍 PLATEAU 2
⏰ 04.40 PM – 05.40 PM

04.40 PM  Refractory lining material in Iron Making Process – An overview with development and characterisation study of critical properties
Dey, R., Carborundum Universal Limited (Chennai, IN)

05.00 PM  Traditional refractory designs replaced by innovative refractory solutions in hot blast stoves
van Laar, F., Allied Mineral Technical Services LLC (Ancaster, CA)

05.20 PM  Post-mortem study on Al\textsubscript{2}O\textsubscript{3}-SiC-SiO\textsubscript{2}-C castables used in the blast furnace runners
Darban, S., Université de Toulouse (Toulouse, FR)

TESTING AND STANDARDIZATION III
Chairs: Urbanek, G., RHI Magnesita (Leoben, AT); Baensch, F., Deutsches Institut für Normung (Berlin, DE)

📍 MISTRAL
⏰ 04.40 PM – 05.40 PM

04.40 PM  Bulk density determination of refractory raw materials – faster and better with a spin-dryer
Buhr, A., Almatis (Frankfurt am Main, DE)

05.00 PM  Thermal conductivity: a modified high temperature panel method to speed up measures for lightweight and dense refractory materials
Cappuzzo, S., Stazione Sperimentale del Vetro (Murano, IT)

05.20 PM  Characterization of inclusion populations in metal matrix using automated feature analysis
Kerber, F., TU Bergakademie Freiberg (Freiberg, DE)
**WEDNESDAY 27TH SEPTEMBER**

**MONOLITHIC REFRACTORIES III**
Chairs: Simmat, R., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); Mix, M., Intocast AG (Ratingen, DE)

📍 **MERIDIAN 1**
⏰ **04.40 PM – 05.40 PM**

04.40 PM  **Influence of the type of phosphate additive on the setting kinetics of CA cement bonded refractory castables with special regard to the resulting pH value**
Kasper, J., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE)

05.00 PM  **Influence of deflocculants on the hydrate phase formation and technological properties of CAC-bonded castables during the first heating process**
Noll, B., Koblenz University of Applied Sciences (Höhr Grenzhausen, DE)

05.20 PM  **Impact of nano additives on the performance of low cement refractory castable**
Boris, R., Vilnius Gediminas technical university (Vilnius, LT)

**RAW MATERIALS – BINDERS II / SECONDARY MATERIALS I**
Chairs: Sako, E., Shinagawa Refractories Co., Ltd. (Vinhedo, BR); Rebouillat, L., Pyrotek Inc, Mineral Processing (Drummondville, CA)

📍 **MERIDIAN 2**
⏰ **04.40 PM – 06.00 PM**

04.40 PM  **The Binding of non-cement refractory castables using the technology of Sol–Gel formation in situ**
Cichocki, M., Intocast AG (Krefeld, DE)

05.00 PM  **What if we did not have to dry trough and runners castables anymore?**
Orsolini, H., SHINAGAWA REFRACTORIES CO., LTD (Valinhos, BR)

05.20 PM  **Insights on numerical models to predict potential recyclability of spent refractories from steel making industry**
Salerno, A., Vesuvius, University of Limoges (Limoges, FR)

05.40 PM  **Carbonized wood and sunflower seed hull pellets as a substitution for natural graphite for the production of MgO–C refractories**
Gehre, P., TU Bergakademie Freiberg (Freiberg, DE)

**JOIN US AT WOMEN@REFRACTORIES**
06.00 – 10.00 PM, Room SIRIUS
Get leadership inspiration, connect and exchange with the female force of the refractory industry.

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HYDROGEN III
Chairs: Sperber, J., STEULER-KCH GmbH (Höhr-Grenzhausen, DE); Wetzig, T., Technische Universität Bergakademie Freiberg (Freiberg, DE)

HORIZONT
04.40 PM – 06.00 PM

04.40 PM  Switching to Hydrogen Based Fuels and their Effect on Refractory Linings and Processes
Walls, P., Hitech Materials Pty Ltd (Figtree, AU)

05.00 PM  Phosphate-bonded refractories in hydrogen containing atmosphere
Leber, T., RWTH University (Aachen, DE)

05.20 PM  Hydrogen corrosion of refractory minerals and the impact of SiO-gas
Astoveza, J., IMERYS (Paris, FR)

05.40 PM  Physical properties of refractory bricks and changes of oxide materials after heat treatment at a hydrogen atmosphere
Park, R., Chosun Refractories Co., Ltd (Pohang-si, KR)

POSTER AWARD
Moderation: Prof. Dr. Christos G. Aneziris and Dr. Christian Dannert
Jury: Chris Parr (Imerys, Chair), Jens Sperber (STEULER), Karin Scharrer (refractories WORLDFORUM)

PLATEAU 1
06.00 PM – 06.20 PM

For details please see page 73.

POSTER WALK
FOYER LEVEL 1
06.20 PM – 07.30 PM

For details please see page 73.
THURSDAY 28TH SEPTEMBER

QUICK TIPS

PANEL DISCUSSIONS
- Refractories Recycling 43
- Monolithic Steel Ladle Lining 46
- Models and Digitalisation in Industrial Practice 52

GUSTAV EIRICH AWARD 71

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YOUNG PROFESSIONALS 71

CONFERENCE DINNER 17
## SCHEDULE THURSDAY  28\(^{\text{th}}\) SEPTEMBER

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<td><strong>NON-FERROUS METALLURGY I</strong> 09.00 AM – 10.40 AM  P. 40</td>
<td><strong>STEEL CASTING I</strong> 09.00 AM – 10.40 AM  P. 40</td>
<td><strong>EDUCATION I</strong> 09.00 AM – 10.40 AM  P. 41</td>
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<td>11.00 AM</td>
<td><strong>NON-FERROUS METALLURGY II / FURNACES AND FOUNDRIES</strong> 11.00 AM – 12.00 PM  P. 43</td>
<td><strong>EDUCATION II / MECHANISMS OF CORROSION, EROSION AND CLOGGING I</strong> 11.00 AM – 12.20 PM  P. 44</td>
<td><strong>STEEL CASTING II</strong> 11.00 AM – 12.20 PM  P. 44</td>
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*Schedule Thursday 28th September*
## SCHEDULE THURSDAY  28TH SEPTEMBER

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<td>PANEL DISCUSSION – MODELS AND DIGITALISATION IN INDUSTRIAL PRACTICE 03.40 PM – 04.20 PM</td>
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THURSDAY 28TH SEPTEMBER

NON-FERROUS METALLURGY I
Chairs: Cölle, D., EKW GmbH (Eisenberg, DE); Malczyk, P., Technische Universität Bergakademie Freiberg (Freiberg, DE)

PLATEAU 1
09.00 AM – 10.40 AM

09.00 AM Flame-sprayed calcium aluminate-based coatings for application in the aluminium industry
Gehre, P., TU Bergakademie Freiberg (Freiberg, DE)

09.20 AM New Generation Castables – A Contribution to the discussion of H₂-assisted smelting furnaces for secondary aluminum
Cölle, D., EKW GmbH (Eisenberg, DE)

09.40 AM Comparative post-mortem research on the corrosion resistance of chemically bonded castables in contact with molten aluminum
Madej, D., AGH University of Science and Technology (Krakow, PL)

10.00 AM Steel Ceramic Composites resistant to long-term contact with Molten Aluminum Alloys
Malczyk, P., Technische Universität Bergakademie Freiberg (Freiberg, DE)

10.20 AM Influence of filter surface roughness on the pressure drop of ceramic foam filters
Voigt, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

STEEL CASTING I
Chairs: Karrasch, S., Thyssenkrupp Steel Europe AG (Duisburg, DE); Kreuels, M., Weerulin GmbH (Mülheim an der Ruhr, DE)

PLATEAU 2
09.00 AM – 10.40 AM

09.00 AM Effect of Tundish Plate Refractory Erosion on Steel Quality and Development of Erosion Measurement System
Kim, J., POSCO (Jeollanam-do, KR)

09.20 AM Mineralogical features of tundish MgO-spray and their influence on the reoxidation of Al-killed steel
Loison, L., ArcelorMittal Maizières Research (Maizières-les-Metz, FR)

09.40 AM The influence of Ca, Na-, and P-content of MgO-based resin-free vibratable dry tundish linings on the population of non-metallic inclusions in a steel melt
Veres, D., TU Bergakademie Freiberg (Freiberg, DE)

10.00 AM Reduction of large inclusions in billets by improving the cleanliness of tundish molten steel
Lee, J., Hyundai steel (Korea, KR)

10.20 AM Deterioration mechanism of Al₂O₃-MgO refractory castable in RH refining ladle
Chen, J., Wuhan University of Science and Technology (Wuhan, CN)

ALSO VISIT OUR EVENT FOR YOUNG PROFESSIONALS
09.00 AM – 05.00 PM
REFRAup Lounge, 3rd Floor
Meet the sponsor in the REFRAup Lounge and learn about their latest refractory innovations.

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Sponsored by REFRATECHNIK
THURSDAY 28TH SEPTEMBER

EDUCATION I
Chairs: Poirier, J., University of Orleans (Orleans, FR); de Bilbao, E., CEMHTI UPR 3079 CNRS, Université d’Orléans (Orleans, FR)

MISTRAL
09.00 AM – 10.40 AM

09.00 AM  Reimagining refractories: How professional societies influence the perception of refractory technology and engineering
De Guire, E., The American Ceramic Society (Westerville, OH, US)

09.20 AM  On Refractory Engineering Education Evolution
Rigaud, M., École Polytechnique-Montréal, (Westmount, Qc., CA)

09.40 AM  EU ATHOR project (2017-2022) – Direct impacts on international refractory community
Huger, M., IRCER, University of Limoges (Limoges, FR)

10.00 AM  EU CESAREF project (2022-2026) – A coming contribution to European Green Deal
Huger, M., IRCER, University of Limoges (Limoges, FR)

10.20 AM  Exploration and practice of international education for refractory specialty in WUST
Huang, A., Wuhan University of Science and Technology (Wuhan, CN)

MONOLITHIC REFRACTORIES IV
Chairs: Brochen, E., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); Podwórny, J., Łukasiewicz – Institute of Ceramics and Building Materials (Gliwice, PL)

MERIDIAN 1
09.00 AM – 10.40 AM

09.00 AM  A holistic view and benefits based on a planned CFB boiler castable lining design
A L Braulio, M., 4CAST (São Carlos, BR)

09.20 AM  Influence of Sintering Additives and Sol–Gel Bonding Agents on Workability and Flexural Strength of Cement Free Castables
Ibarra Plata, L., Koblenz University of Applied Sciences (Höhr–Grenzhausen, DE)

09.40 AM  Steel ladle lining management: comparison between different maintenance technologies to increase performance, reduce refractory consumption and waste disposal of used materials
Kranjc, A., Seven Refractories d.o.o. (Divača, SI)

10.00 AM  High Temperature Innovative Zirconia–alumina Ramming Mass
Martynenko, V., Ukrainian Research Institute of Refractories named after A.S. Berezhnoy (Kharkiv, UA)

10.20 AM  Development of Cement Free Dry–Gunning Mix and its Application to Actual Furnaces
Takeuchi, S., MINO CERAMIC CO., LTD. (Kamezakikitaura-cho, Handa-shi, Aichi, JP)
THURSDAY 28TH SEPTEMBER

SECONDARY METALLURGY I
Chairs: Schmidtmeier, D., Almatis GmbH (Ludwigshafen, DE); Neese, J., Refraktechnik Steel GmbH (Düsseldorf, DE)

MERIDIAN 2
09.00 AM – 10.40 AM

09.00 AM The effect of MgO–C refractory materials on the inclusion population within steel
   Kerber, F., TU Bergakademie Freiberg (Freiberg, DE)

09.20 AM A novel member in the CMA-family of aggregates creating more sustainable A–MA steel ladle refractories
   Wöhrmeyer, C., IMERYS (Oberhausen, DE)

09.40 AM Castable matrix concept for robust behaviour in steel ladle bottom repair
   Rojek, G., ArcelorMittal Refractories (Kraków, PL)

10.00 AM Application of Unburned Magnesia Bricks for Steel Secondary Refining Processes
   Tomita, Y., Krosaki Harima Corporation (Kitakyushu, JP)

10.20 AM Application of high-calcium magnesia in ladle brick and its purification effect on molten steel
   LIU, C., Puyang Refractories Group Co., Ltd (PRCO) (Puyang, CN)

RAW MATERIALS – SECONDARY MATERIALS II
Chairs: Schöttler, L., Deutsche Edelstahlwerke Specialty Steel GmbH & Co. KG (Siegen, DE); Tanasic, N., Horn & Co. Group (Siegen–Weidenau, DE)

HORIZONT
09.00 AM – 10.00 AM

09.00 AM Squaring the Circle: Challenges & Opportunities in Recycling Refractory Minerals
   O’Driscoll, M., IMFORMED (Epsom, GB)

09.20 AM Latest advanced developments in the implementation of Circular Economy strategy in the refractory waste management
   Soto, A., Sidenor I+D (Basaúrri, ES)

09.40 AM Establishing circular economy for refractories in cement applications by advanced recycling technologies
   Königshofer, S., RHI Magnesita GmbH (Leoben, AT); Gellth, M., RHI Magnesita GmbH (Leoben, AT)

BE THERE
GUSTAV EIRICH AWARD
11.00 AM – 12.20 PM
MERIDIAN 1
To promote ideas and, at the same time, to support young talents in technical disciplines.

Sponsored by EIRICH
THURSDAY 28TH SEPTEMBER

PANEL DISCUSSION – RECYCLING OF REFRACTORIES
Moderation: Schöttler, L., Deutsche Edelstahlwerke Specialty Steel (Siegen, DE)
Siebring, R., Tata Steel (IJmuiden, NL); Jansen, H., Refratechnik Steel (Düsseldorf, DE); Zettl, K.-M., RHI Magnesita (Vienna, AT); Tanasic, N., Mireco (Siegen-Weidenau, DE); O’Driscoll, M., IMFORMED (Epsom, UK)

HORIZONT
10.00 AM – 10.40 AM

Recycling of refractories is important to conserve limited resources and reduce the carbon and ecological footprint in the refractory industry. For recycling of refractories, efficient reclaiming technology but also lining concepts taking the reclaiming already into account are as important as to overcome the perception that refractories containing recycle material automatically would mean worse quality or performance. An international group of experts from the industries will discuss this in a panel at UNITECR.

NON-FERROUS METALLURGY II / FURNACES AND FOUNDRIES
Chairs: Moritz, K., Technische Universität Bergakademie Freiberg (Freiberg, DE); Szczerba, J., AGH University of Science and Technology (Kraków, PL)

PLATEAU 1
11.00 AM – 12.00 PM

11.00 AM  Interactions between the gas phase in a nickel flash smelting furnace and the refractory lining
Lindgren, M., Metso Outotec (Pori, FI)

11.20 AM  \(\text{Al}_2\text{O}_3-\text{MgAl}_2\text{O}_4\) refractory material as a Cr-free alternative dedicated to the copper industry
Jastrzębska, I., AGH University of Science and Technology (Kraków, PL)

11.40 AM  The influence of alumina type on corrosion resistance of smart \(\text{Al}_2\text{O}_3-\text{MgO}\) monolithic refractories used in crucible induction furnaces
Bavand-Vandchali, M., Almas Alborz Refractories Co (Tehran, IR)
THURSDAY 28TH SEPTEMBER

EDUCATION II / MECHANISMS OF CORROSION, EROSION AND CLOGGING I
Chairs: Huger, M., IRCER, University of Limoges (Limoges, FR); Rigaud, M., École Polytechnique-Montréal, (Westmount, Qc., CA)

PLATEAU 2
11.00 AM – 12.20 PM

11.00 AM From unpopular matter to smart subject: public funding of refractory research and PhD education by DFG research programs at TU Freiberg
Gehre, P., TU Bergakademie Freiberg (Freiberg, DE)

11.20 AM Bachelor of ceramic science (Dual) at Koblenz University of Applied Science – an opportunity for the industry to overcome skills shortage
Krause, O., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

11.40 AM Effect of the impregnation with liquid glass on the properties of refractory castable
Malaiškienė, J., Vilnius Gediminas technical university (Vilnius, LT)

12.00 PM Numerical Analysis of Molten Steel Infiltration in Porous Bricks
Matsumoto, S., Krosaki Harima Corporation (Kitakyushu City, JP)

STEEL CASTING II
Chairs: Malczyk, P., Technische Universität Bergakademie Freiberg (Freiberg, DE); Helmus, D., Knöllinger Keramische Verschleißteile GmbH (Hillscheid, DE)

MISTRAL
11.00 AM – 12.20 PM

11.00 AM Development of unfired and non-impregnated slide gate plates as a contribution to reducing emissions of carbon bonded refractories
Helmus, D., Knöllinger Keramische Verschleißteile GmbH (Hillscheid, DE)

11.40 AM The effect of selected metallic additives on the properties of the Al2O3-C refractory material
Świerszcz, R., Zakłady Magnezytowe “ROPCZYCE” S.A. (Ropczyce, PL)

12.00 PM Effect of recycled materials from isostatic pressing products on the strength of Al2O3–C refractory and improvement measures
Pan, L., Puyang Refractories Group Co., Ltd. (Puyang, CN)

GUSTAV EIRICH AWARD
MERIDIAN I
11.00 AM – 12.20 PM

Prizegiving for the three best dissertations (Ph.D. theses) in the field of refractories, and lectures (20 minutes each) from the three winners.

For details please see page 71.
THURSDAY 28TH SEPTEMBER

RAW MATERIALS – SECONDARY MATERIALS III
Chairs: Dannert, C., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); O’Driscoll, M., IMFORMED (Epsom, GB)

📍 MERIDIAN 2  🕒 11.00 AM – 12.20 PM

11.00 AM  Investigation of the influence of impurities typical in secondary raw materials on the behavior of high alumina castables – Part I: design of the castables, setting properties and high temperature fracture behavior
Erbar, L., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

11.20 AM  Investigation of the role of impurities typical in secondary raw materials on the behaviour of high alumina castables – Part II: Influence on thermomechanical behaviour
Podwórny, J., Lukasiewicz – Institute of Ceramics and Building Materials (Gliwice, PL)

11.40 AM  The Properties of MgO–C refractories with a new recycled MgO–C raw material
Lee, T., POSCO CHEMICAL (Pohang, KR)

12.00 PM  Technical challenges for recycling processing and utilization ramp-up
Naves Moraes, M., RHI Magnesita (Belo Horizonte, BR)

SECONDARY METALLURGY II
Chairs: Zobec, E., Seven Refractories d.o.o. (Divacja, SI); Viertauer, A., Mayerton Refractories Ltd (Solihull, GB)

📍 HORIZONT  🕒 11.00 AM – 11.40 AM

11.00 AM  Steel ladle: capacity increase, lining concepts and recycling experience over 25 years
Exenberger, R., voestalpine Stahl GmbH (Linz, AT)

11.20 AM  ECO-TAB – A new alumina aggregate for steel ladle lining
Klaus, S., Almatis GmbH (Frankfurt, DE)
THURSDAY 28TH SEPTEMBER

PANEL DISCUSSION – MONOLITHIC STEEL LADLE LINING
Moderation: Buhr, A., Almatis (Frankfurt, DE)
Exenberger, R., voestalpine Linz (Linz, AT); Vatanen, J., SSAB Raahé (Raahe, FI);
Shepherd, R., thyssenkrupp (Duisburg, DE); Zobec, E., Seven Refractories (Divača, SI);
Mix, M., Intocast (Ratingen, DE); Schwan, M., Mapeko (Neuwied, DE)

HORIZONT
11.40 AM – 12.20 PM

Monolithic lining concepts with relining technology achieve the lowest specific material consumption possible in steel ladles. In addition, carbon-free alumina-spinel materials reduce thermal losses and enable energy saving in the process. However, in spite of these advantages the monolithic steel ladle lining has not yet become the dominant lining technology in Europe or America, other than in Japan. An international group of experts from the steel and the refractory industries will discuss experiences, perceptions, and important topics for implementation of the technology in a panel at UNITECR.

CEMENT AND LIME I
Chairs: Klischat, H., Refratechnik Cement GmbH (Göttingen, DE); Sarioglu, N., KUMAS Manyezit Sanayi A.Ş. (Kutahya, TR)

PLATEAU 1
01.20 PM – 02.40 PM

01.20 PM Challenges for a Cement Producer
Wagner, V., HeidelbergCement AG (Heidelberg, DE)

01.40 PM Near-customer engineering management for advanced applications in the cement industry
Vesenberg, B., EKW GmbH (Eisenberg, DE)

02.00 PM Effective CO₂-Reduction for Rotary Kiln Burning Processes by Using Energy Efficient Linings
Klischat, H., Refratechnik Cement GmbH (Göttingen, DE)

02.20 PM Energy-saving Refractory Bricks for Sustainable Lining of Rotary Kilns
Akkasoglu, U., KUMAS Manyezit Sanayi A.Ş. (Kutahya, TR)
THURSDAY 28TH SEPTEMBER

MECHANISMS OF CORROSION, EROSION AND CLOGGING II
Chairs: Krause, O., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE); Erbar, L., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

**PLATEAU 2**

01.20 PM CaO attack on refractory materials of the system SiO₂-Al₂O₃
Weber, K., Refratechnik Cement GmbH (Göttingen, DE)

01.40 PM Impact of hydrogen on carbon monoxide disintegration of refractories
Liefhebber, J., Tata Steel Nederland (IJmuiden, NL)

02.00 PM Knowledge about the Carbon Deposition in the Microstructure of Refractory Materials
Koch, A., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

02.20 PM The influence of the gas permeability of refractory materials on carbon deposition in CO containing atmospheres
Steffen, T., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE)

STEEL CASTING III
Chairs: Trummer, B., RHI Magnesita GmbH (Vienna, AT); Bogan, J., HarbisonWaller International (West Mifflin, USA)

**MISTRAL**

01.20 PM Prevention of Abnormal Damage of CaO–ZrO₂–C for Submerged Entry Nozzles
Lin, W., Shinagawa Refractories Co., Ltd. (Bizen, JP)

01.40 PM Development and implementation of holistic approach to address clogging phenomena in continuous casting of steel for Vesuvius flow control customer
Fallah-Mehrjardi, A., VESUVIUS (Ghlin, BE)

02.00 PM Submerged Entry Nozzle preheating effect on its permeability
de Bilbao, E., CEMHTI UPR 3079 CNRS, Université d’Orléans (Orleans, FR)

02.20 PM Simulating methods for Al₂O₃ cloggings on SEN
Liu, G., Sinosteel Luoyang Institute of Refractories Research Co., Ltd. (Henan, CN)
THURSDAY 28TH SEPTEMBER

MONOLITHIC REFRACTORIES V
Chairs: Kasper, J., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE); Parr, C., Imerys (Lyon, FR)

📍 MERIDIAN 1 🕒 01.20 PM – 02.20 PM

01.20 PM How the composition of self-flowing refractory castables influences their rheological properties
  Bastian, M., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE)

01.40 PM Development of a printable alumina-based composition of refractory castable for 3D printing preshaped parts
  Abdelouhab, S., Belgian Ceramic Research Centre (Mons, BE)

02.00 PM Adaptation of the contour-crafting process to refractories and investigation of material properties after the 3D printing process
  Holleyn, F., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

RAW MATERIALS – SECONDARY MATERIALS IV / SECONDARY METALLURGY III
Chairs: Jansen, H., Refratechnik Steel GmbH (Düsseldorf, DE); Li, H., Sinosteel Luoyang Institute of Refractories Research Co., Ltd. (Luoyang, Henan, CN)

📍 MERIDIAN 2 🕒 01.20 PM – 02.40 PM

01.20 PM Recyclate-containing magnesia-carbon refractories – Influence on the non-metallic inclusions in steel
  Moritz, K., Technische Universität Bergakademie Freiberg (Freiberg, DE)

01.40 PM Effect of Different Carbon Sources on Ultra Low Carbon Bricks for Steel Applications
  Cabral Silva, S., RHI Magnesita (Contagem, BR)

02.00 PM Unfired Zero C Brick for Energy Savings and Performance Increasing of Metal Line for Steel Ladle
  Pagliosa, C., RHI Magnesita (Contagem, BR)

02.20 PM Improved slag corrosion resistance of MgO–C refractories for ladle slag line
  Zhu, T., Wuhan University of Science and Technology (Wuhan, CN)
THURSDAY 28\textsuperscript{TH} SEPTEMBER

DIGITALIZATION I

Chairs: Siebring, R., Tata Steel (IJmuiden, NL); Dannert, C., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE)

- **HORIZONT**
  - **01.20 PM – 02.40 PM**
    - **01.20 PM** Artificial Intelligence (AI) for supporting useful life and thickness estimation of the refractory bricks of the ladle lining in steel-making
      - Arostegi, M., Tecnalia Research & Innovation (Derio Bizkaia, ES)
    - **01.40 PM** Artificial Intelligence applied to enhance the thermal management of torpedo ladle cars
      - Garcia Campos, M., Tata Steel Nederland (IJmuiden, NL)
    - **02.00 PM** The use of numerical modelling for refractories optimisation in the reheating furnaces at Tata Steel Nederland
      - van Sikkelerus, F., Tata Steel Nederland (IJmuiden, NL)
    - **02.20 PM** A new standard from WRA for digital exchange of refractories data
      - Platzer, A., RHI Magnesita (Radenthein, AT)

CEMENT AND LIME II / CHEMICAL AND PETROCHEMICAL

Chairs: Reif, G., RHI Magnesita (Leoben, AT); Klischat, H., Refratechnik Cement GmbH (Göttingen, DE)

- **PLATEAU 1**
  - **03.00 PM – 04.20 PM**
    - **03.00 PM** Customized Linings for Upper Transition Zones of Rotary Kilns for Contemporary Cement Clinker Production Conditions
      - Wirsing, H., Refratechnik Cement GmbH (Göttingen, DE)
    - **03.20 PM** Refractory Linings for Cement Rotary Kilns Contributing to Environmental Impact Reduction
      - Ohno, M., MINO CERAMIC CO., LTD. (Handa-shi, Aichi, JP)
    - **03.40 PM** Premature refractory lining integrity deterioration in a syn-gas reforming furnace
      - Manabendra, Maity, Saudi Basic Industries Corporation (SABIC) (Jubail, Saudi Arabia)
    - **04.00 PM** Refractory Lining Condition Assessment and Integrity Management of Hydrocarbon Process Furnaces and Reactors
      - Manabendra, Maity, Saudi Basic Industries Corporation (SABIC) (Jubail, Saudi Arabia)
THURSDAY 28TH SEPTEMBER

MECHANISMS OF CORROSION, EROSION AND CLOGGING III
/ TESTING AND STANDARDIZATION IV
Chairs: Voigt, C., Technische Universität Bergakademie Freiberg (Freiberg, DE); Gasser, A., University of Orléans (Orléans, FR)

PLATEAU 2
⏰ 03.00 PM – 04.00 PM

03.00 PM Exceptional “Highlights” of extreme Wear of Refractories
   Neese, J., Refratechnik Steel GmbH (Düsseldorf, DE)

03.20 PM Improving the refractories selection regarding their thermal shock resistance (TSR) by using practice-oriented investigations promoting experimental thermal loading close to their service conditions
   Brochen, E., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE)

03.40 PM Thermal Shock Resistance of Alumina Foam Filters – a Comparative Study
   Gumban, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

STEEL CASTING IV
Chairs: Lüftenegger, A., Vesuvius Plc (London, GB); Kitazawa, Y., Krosaki Harima Corporation (Kitakyushu, JP)

MISTRAL
⏰ 03.00 PM – 04.00 PM

03.00 PM Evaluation of oxide-based SEN and oxide-less SEN on Nozzle Clogging
   Kim, M., Chosun Refractories Co., Ltd (Pohang City, KR)

03.20 PM Journey of “Thin Slab SEN” Performance improvement, to become benchmark for Global CSP Caster
   Ali, S., TRL Krosaki Refractories Ltd. (Belpahar, IN)

03.40 PM Casting of CaFe treated steel and its effect on recrystallization and lifetime of ZrO2 metering nozzles
   Bahrami Samani, M., Mehrgodaz Refractories Company (Sefiddasht, Chaharmahal and Bakhtiari, IR)
THURSDAY 28TH SEPTEMBER

DRYING AND HEATING OF MONOLITHIC REFRACTERIES I
Chairs: Tonnesen, T., RWTH Aachen University (Aachen, DE); Shukla, D., VESUVIUS (Barlborough, GB)

📍 MERIDIAN 1
🕒 03.00 PM – 04.20 PM

03.00 PM Online drying monitoring system for refractory castbles
Stein, T., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

03.20 PM Permeability-Enhancing Drying Additives – A Perspective from in-situ Analysis
Moreira, M., Federal University of São Carlos (Sao Carlos, BR)

03.40 PM Practical experimentation and model development for the drying of monolithic refractory castables
Lambert, M., Allied Mineral Products, LLC (Columbus, OH, US)

04.00 PM Analysis of weep hole efficiency in steel ladles via computational simulations
Moreira, M., Federal University of São Carlos (Sao Carlos, BR)

SECONDARY METALLURGY IV
Chairs: Mix, M., Intocast AG (Ratingen, DE); Loison, L., ArcelorMittal Maizières Research (Maizières-les-Metz, France)

📍 MERIDIAN 2
🕒 03.00 PM – 04.20 PM

03.00 PM Interaction of molten secondary metallurgical ladle slag with MgO–C refractories
Yehorov, A., TU Bergakademie Freiberg (Freiberg, DE)

03.20 PM High Durability Ladle Treatment (LT) Lance for Steel Secondary Refining
Yamada, K., Krosaki Harima Corporation (Kitakyushu City, JP)

03.40 PM Graphene added Carbon MgO–C for Slag zone in steel ladle
Ghosh, G., Tata Steel (Jamshedpur, IN); Panigrahi, P., Tata Steel (Jamshedpur, IN)

04.00 PM Effects of Calcium Magnesium Aluminate Binder on Properties of Alumina-Magnesia Castables for Steel Ladle
Chen, K., China Steel Corporation (Kaohsiung, TW)
THURSDAY 28TH SEPTEMBER

DIGITALIZATION II
Chairs: van Beurden, P., Tata Steel (IJmuiden, NL); Tomas, M., RHI Magnesita GmbH (Vienna, AT)

HORIZONT
⏰ 03.00 PM – 03.40 PM

03.00 PM  Converter on life-support: A structured approach to determine the governing parameters of refractory wear to stabilise and prolong the lining lifetime
Vermeulen, F., Tata Steel (IJmuiden, NL)

03.20 PM  Into the Unknown: Explaining and predicting slag line wear based on process parameters
Gil, A., Tata Steel (IJmuiden, NL)

PANEL DISCUSSION – MODELS AND DIGITALISATION IN INDUSTRIAL PRACTICE
Moderation: Siebring, R., Tata Steel (IJmuiden, NL)
van Beurden, P., Tata Steel (IJmuiden, NL); Schwarz, M., Deutsche Edelstahlwerke (Siegen, DE); Tomas Casado, M., RHI Magnesita (Rotterdam, NL); Platzer, A., RHI Magnesita (Radenthein, AT); Romero Baivier, S., Vesuvius (Lille, FR)

HORIZONT
⏰ 03.40 PM – 04.20 PM

The refractory and its user industries are still very often driven by trial and error, which inherently leads to too long development cycles for new approaches. Modelling and digitalised data analysis can contribute to faster innovation which is needed to overcome the carbon challenge. An international group of experts will discuss in a panel at UNITECR which data are available or would be required, how to approach data exchange between suppliers and users of refractories, and what has been achieved so far.
THURSDAY  28TH SEPTEMBER

GLASS
Chairs: Postrach, S., RHI Magnesita (Wiesbaden, DE); Kunert, C., SCHOTT AG (Mainz, DE)

PLATEAU 1
⏰ 04.40 PM – 06.00 PM

04.40 PM  Fused Silica – The answer to challenging furnace conditions
Dietrich, M., RHI Glas GmbH (Wiesbaden, DE)

05.00 PM  Comparison of two conventional and containerless solidified fused cast AZS materials
Niessen, J., RWTH Aachen University (Aachen, DE)

05.20 PM  Study of the evolution in temperature of mechanical properties and consolidation of a refractory
Bigeard, A., Saint-Gobain Research Provence (Cavaillon, FR)

05.40 PM  Fused cast AZS blocks and their mineral phases after production, after annealing the furnace and in use
Fleischmann, B., Hüttentechnische Vereinigung der Deutschen Glasindustrie (HVG) e.V. (Offenbach, DE)

SYNTHESIS OF MATERIALS I
Chairs: Kerber, F., TU Bergakademie Freiberg (Freiberg, DE); Wöhrmeyer, C., IMERYS (Oberhausen, DE)

PLATEAU 2
⏰ 04.40 PM – 06.00 PM

04.40 PM  MgO–C refractories based on refractory recyclates and environmentally friendly binders
Stadtmüller, T., Technische Universität Bergakademie Freiberg (Freiberg, DE)

05.00 PM  The Role of Andalusite in Refractory Castables and possible Substitutions – Part 1: Thermal behaviour of Andalusite bearing Castables
Simmat, R., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE)

05.20 PM  The Role of Andalusite in Refractory Castables and possible substitutions – Part 2: Changes in Ceramic Structure During Heat-Up
Paul, J., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

05.40 PM  The Role of Andalusite in Refractory Castables and possible substitutions – Part 3: First attempt to redesign required properties within the parameters of andalusite free castables
Abdelgawad, K., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)
THURSDAY 28TH SEPTEMBER

STEEL CASTING V
Chairs: Kirill, A., Vesuvius R&D (Ghlin, BE)

MISTRAL
04.40 PM – 05.40 PM

04.40 PM  The development of insulation coating
Koide, W., TYK Corporation (Ena-City, Gifu Pref., JP)

05.00 PM  Yttria magnesia co-stabilized zirconia refractories for application as functional components in continuous steel casting
Heuer, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

05.20 PM  Extruded cellular filter components for steel melt filtration in industrial continuous casting of steel
Wetzig, T., Technische Universität Bergakademie Freiberg (Freiberg, DE)

TESTING OF MONOLITHIC REFRACTORIES
Chairs: Quirmbach, P., University of Koblenz (Koblenz, DE); Klaus, S., Almatis GmbH (Frankfurt, DE)

MERIDIAN 1
04.40 PM – 06.00 PM

04.40 PM  New method for the determination of the dynamic viscosity of castables
Bastian, M., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE)

05.00 PM  Rheology of refractory castables – Part 1: A novel 3D spread flow measuring device allows to determine more precisely the work-ability of refractory castables
Krause, O., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

05.20 PM  Thermo-mechanical behavior of alumina-magnesia castables and its lining lifetime simulation
Dai, Y., Wuhan University of Science and Technology (Wuhan, CN)

05.40 PM  Rheology of refractory castables – Part 2: Influence of the mixing energy input in terms of mixing time and velocity on the spread measured with a new 3D-Spread-flow device with special regard towards the ambient working conditions.
Kakavand, M., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)
THURSDAY 28TH SEPTEMBER

SECONDARY METALLURGY V
Chairs: Volkova, O., TU Bergakademie Freiberg (Freiberg, DE); Mishra, N., RHI Magnesita India (Bhiwadi, IN)

📍 MERIDIAN 2
⏰ 04.40 PM – 06.00 PM

04.40 PM  **Chrome Free Baked Magnesia Brick – A Really Environmentally Friendly Product for RH Degassers**
Ramos, V., Shinagawa Refractories Co., Ltd (Vinhedo, BR)

05.00 PM  **Effect of special carbon additive on the properties of dolomite-carbon refractories for steel ladle application**
Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

05.20 PM  **Improving the quality and productivity of steel by using quicklime surface treated with silicone oil**
Shin, G., POSCO CHEMICAL (Sinhang-ro, Nam-gu, Pohang-si, Gyeongsangbuk-do, KR)

05.40 PM  **Improved comprehensive properties of Al$_2$O$_3$-MgO-C refractories containing lightweight tabular alumina aggregates**
Chen, Q., Puyang Refractories Group Co., Ltd. (PRCO) (Puyang, CN)

DIGITALIZATION III
Chairs: Schemmel, T., Refratechnik Steel GmbH (Düsseldorf, DE); Sinnema, S., Tata Steel Nederland (IJmuiden, NL)

📍 HORIZONT
⏰ 04.40 PM – 05.40 PM

04.40 PM  **Refractory Performance Tracking: from materials development to application monitoring**
Dos Santos, M., Federal University of São Carlos (Sao Carlos, BR)

05.00 PM  **Application of Machine Learning in the assessment of the wear rate of MgO-C refractory materials dedicated for steel industry**
Sado, S., Zakłady Magnezytowe “ROPCZYCE” S.A. (Warsaw, PL)

05.20 PM  **Experimental and numerical investigation of a pilot steel ladle**
Gajjar, P., University of Minho (Guimaraes, PT)

CONFERENCE DINNER
📍 GESSELLSCHAFTSHAUS PALMENGARTEN
   PALMENGARTENSTRASSE 11, 60325 FRANKFURT AM MAIN
⏰ 06.30 PM – 00.00 PM

For details please see page 17
FRIDAY
29TH SEPTEMBER
» QUICK TIPS
Dedicated to the refractory user industry from the sectors of iron and steel, non-ferrous metals, aluminium, cement, lime, glass and ceramics, high-performance composites and coatings, foundry, petrochemical, power generating and waste incineration.
**SCHEDULE FRIDAY 29TH SEPTEMBER**

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<th>Time</th>
<th>Plateau 1</th>
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<td>09.00 AM</td>
<td>ENERGY &amp; WASTE INCINERATION I 09:00 AM – 10:40 AM</td>
<td>SYNTHESIS OF MATERIALS II 09:00 AM – 10:40 AM</td>
<td>ENGINEERING OF REFRactories 09:00 AM – 10:20 AM</td>
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<td>11.00 AM</td>
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<td>SYNTHESIS OF MATERIALS III 11:00 AM – 12:20 PM</td>
<td>INNOVATION IN REFRactory APPLICAtions 11:00 AM – 12:20 PM</td>
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FRIDAY 29TH SEPTEMBER

ENERGY & WASTE INCINERATION I
Chairs: Touzo, B., Calderys (Neuwied, DE); Postrach, S., RHI Magnesita (Wiesbaden, DE)

PLATEAU 1
⏰ 09.00 AM – 10.40 AM

09.00 AM Development of a high-temperature-TES system using refractory materials for long-term storage of renewable energy
Hennemann-Hohenfried, E., Refratechnik Steel GmbH (Bendorf, DE)

09.20 AM The influence of firing parameters on the formation of nitride phases in nitride bonded silicon carbides
Kehren, J., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE)

09.40 AM Development of high SiC fraction refractories with silica sol binder
Goto, H., Calderys Japan Co., Ltd (Yoshibora, Shidare-cho, Toyota, Aichi, JP)

10.00 AM A major step towards the replacement of chromium oxide in refractories for incinerators and other applications
Soth, R., IMERYS (Paris, FR)

10.20 AM Oxidation behaviors and mechanisms of SiC refractory materials used in municipal waste incinerators containing anti-oxidizing additives
Lang, C., BCRC (Mons, BE)

SYNTHESIS OF MATERIALS II
Chairs: Salvini, V., Federal University of São Carlos (São Carlos, BR); Heuer, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

PLATEAU 2
⏰ 09.00 AM – 10.40 AM

09.00 AM Refractory ink-coated porous insulators to prevent microwave plasma discharges for high-temperature microwave heating
Ferreira Cardoso, A., Federal University of São Carlos (São Carlos, BR)

09.20 AM High-temperature damage and mechanical behavior of niobium–alumina refractory composites under compression and bending
Günay, G., TU Bergakademie Freiberg (Freiberg, DE)

09.40 AM Comparison of solidification behavior of synthetic mullite and mullite-forming raw materials by aero-acoustic levitation
Mühmer, D., RWTH Aachen University (Aachen, DE)

10.00 AM Carbon-free electrically heatable coarse-grained composite materials consisting of (Nb/Ta)−Al₂O₃ and alumina
Franke, N., TU Bergakademie Freiberg (Freiberg, DE)

10.20 AM Steel Ceramic Composite anodes based on recycled MgO–C lining bricks for applications in cryolite/aluminum melts
Yaroshevskyi, S., TU Bergakademie Freiberg (Freiberg, DE)
FRIDAY 29TH SEPTEMBER

ENGINEERING OF REFRACTORIES
Chairs: Romero Baivier, S., Vesuvius (Ghlin, BE); Gruber, D., Montanuniversität Leoben (Leoben, AT)

MISTRAL
09.00 AM – 10.20 AM

09.00 AM Micro-mechanical modelling of heterogenous materials containing microcracks with discrete element method
Huger, M., IRCER, University of Limoges (Limoges, FR)

09.20 AM Development of an orthotropic elastic-visco-plastic behaviour law for the thermomechanical modelling of refractory masonries
Gasser, A., University of Orléans (Orléans, FR)

09.40 AM FE modelling of refractories’ material properties based on 3D microstructural analysis
Pirkelmann, S., Fraunhofer ISC, Zentrum HTL Bayreuth (Bayreuth, DE)

10.00 AM Multiscale modeling of gas–slag–refractory interactions and degradation mechanisms
Laukkanen, A., VTT Technical Research Centre of Finland Ltd (Espoo, FI)

DRYING AND HEATING OF MONOLITHIC REFRACTORIES II
Chairs: Krause, O., Koblenz University of Applied Sciences (Höhr-Grenzhausen, DE); Goski, D., Allied Mineral Products, LLC (Columbus, US)

MERIDIAN 1
09.00 AM – 10.40 AM

09.00 AM A further link between laboratory analysis and industrial process optimization – The size effect on drying of refractory castables
Moreira, M., Federal University of São Carlos (São Carlos, BR)

09.20 AM Microwave sintering of ZnO-containing in-situ spinelized alumina-based castables
Borges, O., Federal University of São Carlos (São Carlos, BR)

09.40 AM Impact of Dryout Heating Rate on Physical Properties
Sayre, J., HarbisonWalker International (Pittsburgh, US)

10.00 AM Observations on the strength and drying performance of SolCast castables
Piippo, A., Bet-Ker Oy (Raase, FI)

10.20 AM Effect of curing temperature and curing time on the properties of low cement bonded corundum – spinel castables for well block
Zhang, S., Punai Refractories Group Co., Ltd. (PRCO) (Henan province, CN)
FRIDAY 29TH SEPTEMBER

RAW MATERIALS – ALUMINA MATERIALS I
Chairs: Klaus, S., Almatis GmbH (Frankfurt, DE); Bunt, N., IMERYS (Paris, FR)

📍 MERIDIAN 2
⏰ 09.00 AM – 10.40 AM

09.00 AM Data-based carbon footprint of Imerys specialty minerals for refractories
Ranaivoharilala, S., IMERYS (Paris, FR)

09.20 AM Sintering and thermo-mechanical characterization of a novel refractory grade bauxite
Noronha, L., Federal University of São Carlos (São Carlos, BR)

09.40 AM Almatis Mission NeutrAL represents our sustainable commitment to the refractory raw materials industry
Compson, C., Almatis (Leetsdale, US)

10.00 AM Managing Performance of Calcined Aluminas through Manufacturing Process Modifications
Zetterström, C., Alteo Alumina (Gardanne, FR)

10.20 AM Influence of mineral composition on the processing of iron-rich bauxite raw materials by using hydrochloric acid leaching
Sax, A., University of Koblenz (Koblenz, DE)

PRIMARY METALLURGY II
Chairs: Brüggmann, C., Deutsche Edelstahlwerke Specialty Steel GmbH & Co. KG (Siegen, DE); Sengupta, U., Refratechnik Steel India (Vizag, IN)

📍 HORIZONT
⏰ 09.00 AM – 10.40 AM

09.00 AM Innovative Design and Installation Technique for Slag Door of CONARC Furnace – A unique Approach for Performance Hike-up
Schemmel, T., Refratechnik Steel GmbH (Düsseldorf, DE)

09.20 AM Novel microporous MgO-based high-temperature thermal insulator
Salomão, R., University of São Paulo (São Carlos, BR)

09.40 AM Next Generation Electric Arc Furnace Gunning Products for Improved Sustainability
Gurcan, C., Minteq Asmas (Gebze, Kocaeli, TR)

10.00 AM Refractory solutions to “the Carbon Challenge”
Li, Y., Wuhan University of Science and Technology (Wuhan, CN)

10.20 AM Prefabricated slag door solution – resolve a well-known obstacle to increase EAF performance
Buchberger, B., Mayerton Refractories Ltd (Solihull, GB)
FRIDAY 29TH SEPTEMBER

SYNTHESIS OF MATERIALS III
Chairs: Moritz, K., Technische Universität Bergakademie Freiberg (Freiberg, DE); Steffen, T., Forschungsgemeinschaft Feuerfest e. V. (Höhr-Grenzhausen, DE)

**PLATEAU 2**

11.00 AM – 12.20 PM

11.00 AM  Engineered Refractory Aggregates Comprising Higher Grade Shell and Lower Grade Core
Zhang, S., University of Exeter (Exeter, GB)

11.20 AM  Preparation and Properties of Whisker Composite Magnesium Aluminate Spinel Refractories by In-situ Catalysis
Schulze-Bergkamen, H., RHI Magnesita (Dalian, CN)

11.40 AM  Compositional Complex Ceramic coatings for corrosion resistance of refractories
Maier, J., Fraunhofer ISC, Zentrum HTL, Würzburg (DE)

12.00 PM  Dispersion of surface modified Nano additives by silanol groups and its effect on properties of Oxide and Oxide–C refractories
Nourbakhsh, A., Arvin Dirgodaz Vijeh Co (Isfahan, IR)

INNOVATION IN REFRACTORY APPLICATIONS
Chairs: Dannert, C., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); Braulio, M., 4CAST (Sao Carlos, BR)

**MISTRAL**

11.00 AM – 12.20 PM

11.00 AM  Design optimization of refractory castable panels for alumina calciner linings via finite element simulations
Ierck Pereira, C., Federal University of São Carlos (Sao Carlos, BR)

11.20 AM  Development of Vibrocast Alumina–spinel Inner Nozzles for Vacuum Ingot Casting
Martynenko, V., Ukrainian Research Institute of Refractories named after A.S. Berezhnoy (Kharkiv, UA)

11.40 AM  Development of high-performance silica refractory with low residual quartz for coke oven batteries
Biswajit, G., TRL Krosaki Refractories Ltd. (Belpahar, IN)

12.00 AM  Development of high chrome oxide gasifier refractories – one step ahead towards carbon neutrality
Nayak, J., TRL Krosaki Refractories Ltd. (Belpahar, IN)
FRIDAY 29TH SEPTEMBER

DRYING AND HEATING OF MONOLITHIC REFRACTORIES III
Chairs: Simmat, R., Forschungsgemeinschaft Feuerfest e. V. at the European Centre for Refractories (Höhr-Grenzhausen, DE); Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

- MERIDIAN 1
  11.00 AM – 12.20 PM
  11.00 AM  Impact of curing temperatures and drying under hydrothermal conditions on phase composition and microstructure of cement bonded castables
            Koehler, A., Almatis GmbH (Ludwigshafen, DE)
  11.20 AM  CO₂-footprint reduction in dry tundish wear lining installation with respect to refractory material and electrical equipment (eMould) technology
            Sari, E., Weerulin GmbH (Mülheim an der Ruhr, DE)
  11.40 AM  Investigation of the Drying Behavior of Low Cement Castables
            Klippel, U., Calderys Deutschland GmbH (Neuwied, DE)
  12.00 PM  A novel type of anti-spalling natural straw fibers for refractory castables
            Zhang, M., Höganäs Borgenstad AB (Bjuv, SE)

RAW MATERIALS – OTHER MATERIALS
Chairs: Cölle, D., EKW GmbH (Eisenberg, DE); Pandolfelli, V., Federal University of São Carlos (São Carlos, BR)

- MERIDIAN 2
  11.00 AM – 12.00 PM
  11.00 AM  Tailor-made Polycarboxylate Ethers to Improve Properties of Castable Mix Designs
            Riedmiller, J., BASF Construction Additives (Trostberg, DE)
  11.20 AM  Innovative approaches for energy-intensive production processes of shaped refractory products for the steel industry
            Cölle, D., EKW GmbH (Eisenberg, DE)
  11.40 AM  Digitalization to realize an automatic and continuous refractory maintenance system SCANTROL™ 4.0 for the EAF
            Lamm, R., Minteq International GmbH – Ferrotron Division (Duisburg, DE)
Friday 29th September

Primary Metallurgy III
Chairs: Brüggmann, C., Deutsche Edelstahlwerke Specialty Steel GmbH & Co. KG (Siegen, DE); Sengupta, U., Refratechnik Steel GmbH (Vizag, IN)

Horizont
11.00 AM – 12.40 PM

11.00 AM Improve furnace lifetime and operational safety by robotic gunning repair
Wolf, C., Velco GmbH (Velbert, DE)

11.20 AM Effect of Magnesia Grain Size Composition on Internal Pore Structure in Magnesia Carbon Refractory Bricks
Furukawa, T., Shinagawa Refractories Co., LTD (Bizen-City, Okayama, JP)

11.40 AM Development of integrated methods for hot repair of converter lining based on Magnesian materials of “Gir-Refractories”
Goryuk, M., Physical-Technological Institute of Metals and Alloys, National Academy of Sciences of Ukraine (Kyiv, UA)
POSTERS

P 01  The preparation of electrical-grade magnesia from microcrystalline magnesite
Li, Z., Puyang Refractories Group Co., Ltd. (Puyang, Henan, CN)

P 03  Effect of particle size and calcinated conditions on the properties of highly active magnesium oxide from microcrystalline magnesite
Wang, X., Punai Refractories Group Co., Ltd. (PRCO) (Puyang, Henan, CN); Liu, C., Puyang Refractories Group Co., Ltd. (PRCO) (Puyang, CN)

P 07  A novel approach to develop sustainable cement-free magnesia castables
Peng, H., Elkem Silicon Products Development (Kristiansand, NO)

P 10  Effect of H2O2 addition an anti-explosion performance of Alumina based castables bonded by hydratable Alumina
Wang, Z., State Key Laboratory of Advanced Refractories (Luoyang, CN)

P 11  Development of low CO2 emission repair material at basic oxygen furnace (BOF) application
Brum, P., SHINAGAWA REFRACTORIES CO., LTD (Vinhedo, BR)

P 12  Al2O3-SiC-C castable development with improved oxidation resistance
Jung, B., KOREA REFRACTERIES (Chungcheongnam-do, KR)

P 14  Innovation in Carbon Footprint reduction and sustainability in the manufacturing of Insulation firebricks for lining of blast furnace stove
Natarajan, C., Carborundum Universal Limited (Ranipet, IN)

P 15  Improvement of gas holder system
Imaeda, T., TYK Corporation (Gifu prefecture, JP)

P 16  Development of a Novel Taphole Clay with Toxicity-free and Odor-lighten
Miyajima, S., Krosaki Harima Corporation (Kitakyushu, JP)

P 18  Development of a novel thermal shock protocol of experiment of carbon-based refractory materials
Anhour, K., VESUVIUS, Trento University (Mons, BE)

P 19  KUMAS’s New Generation MgO-C Brick Development
Sarioglu, N., KUMAS Manyezit Sanayi A.Ş. (Kutahya, TR)

P 22  Microstructural evolution and corrosion behavior of rebounded magnesia-chromite refractories used in steelmaking RH furnaces
Bavand-Vandchali, M., Almas Alborz Refractories Co (Tehran, IR)

P 25  Thermophysical properties of Ca2+Cr3+-Fe3+ doped LaAlO3, high emissivity ceramic
Wang, Q., Sinosteel luoyang institute of refractories research co., ltd (Luoyang, CN); Wang, G., Sinosteel luoyang institute of refractories research co., ltd (Luoyang, CN)

P 26  Mechanical and chemical behavior of MgO-C bricks under near-service conditions
Galiliano, P., Tenaris Siderca (Campana, VE)

P 27  Development of olivine based precast castable for tundish weir and dam
Yeh, S., Good Furnace Refractory Industrial Co., Ltd. (Taipei, TW)

P 28  Carbon bonded rods for measurement of molten steel velocity at the meniscus level in the continuous caster mould: from the lab to the plant trials
Luchini, B., Tata Steel Nederland (Velsen-Noord, NL)
POSTERS

P 31 Pureblox 1400, how TRB take up the energy saving challenge while using safer products
Chiartano, S., TRB (Nesles, FR)

P 32 Effects of spinel-calcium aluminate on properties of aluminoná-magnesia based dry ramming mixes
Yuan, W., Wuhan University of Science and Technology (Wuhan, CN)

P 33 Microporous calcium silicate hydrate–based thermal insulators: A critical review
Salomão, R., University of São Paulo (São Carlos, BR)

P 34 Application of Ultra–High Speed Heating Test System – High Temperature Observation of SiC/Fe/Slag Systems
Maeda, T., Okayama Ceramics Research Foundation (Okayama, JP)

P 35 High entropy transition metal diborides powders synthesized via molten salt method
Zhang, H., Wuhan University of Science and Technology (Wuhan, CN)

P 36 Hot thermal shock testing using TOM_wave
Schulze, K., Fraunhofer ISC (Bayreuth, DE)

P 38 Refractory composite aggregates based on Nb–Al2O3 using 3D printing technology
Zienert, T., TU Bergakademie Freiberg (Freiberg, DE)

P 40 The choice of magnesia–carbon refractories for steel ladle lining: a life cycle perspective
Jubayed, M., PEPs (Liège, BE)

P 41 Approaches to solving advanced problems of established refractory designs in non–ferrous metallurgy
Vezzuli, A., EKW Italia S.R.L. (Concorezzo, IT)

P 44 Use of metallurgical residues as potential raw materials for high performance refractory castables
Derensy, M., RWTH Aachen, Calderys, CESAREF (Aachen, DE)

P 48 Degradation behavior of MgO–C refractory by Ar blowing in contact with liquid steel
Myung, J., Tech University of Korea (Gyeonggi-do, KR)

P 49 A novel design for flow stabilizer of tundish by CFD and Water model simulation
Schulze-Bergkamen, H., RHI Magnesita (Dalian, CN)

P 50 Characterization of refractories with regard to the application in H2-containing atmospheres
Bohorquez-Moreno, C., TataSteel, Montanuniversitat Leoben (Velsen Noord, NL)

P 52 Advanced analytics applied to improve the energy efficiency of steel ladle logistics
Ruela, V., Tata Steel, TU Wien (Uitgeest, NL)

P 53 Prediction of performance and assessment of reusability and recycling of refractory materials using non-destructive online evaluation and machine learning algorithms
Gope, A., IRCER (Limoges, FR)

P 55 Combustion characteristics of methane air premixed fuel in ordered porous burners
Pan, L., Puyang Refractories Group Co., Ltd. (Puyang, CN)

P 57 Estimation of refractory castable thermal conductivity: a manufacturer’s perspective
Chang, C., China Ecotek Corporation (Kaohsiung, TW)
POSTERS

P 58  Analysis of corrosion mechanisms of non-cement and low-cement alumina-magnesia gunning mix with special calcined alumina in rotary slag test
Lee, Y., HSIN LIAN HSIN ENTERPRISE CO., LTD (Kaohsiung, TW)

P 59  Ceramic foam filters with a carbon-bonded alumina coating for aluminum melt filtration
Voigt, C., Technische Universität Bergakademie Freiberg (Freiberg, DE)

P 60  Enhanced infrared radiation of LaAlO₃ ceramics via Co²⁺ doping
Pan, L., Puyang Refractories Group Co., Ltd. (Puyang, CN)

P 61  Formation of isolation layer between the refractory lining and molten steel/slag: industrial trials in refining ladle
Chen, J., Wuhan University of Science and Technology (Wuhan, CN)

P 62  Refractory Handling Manipulator for safe & better ergonomics
Sahin, A., TRL Krosaki Refractories Limited (Jamshedpur, Jharkhand, IN)

P 63  Improvement of thermo-mechanical properties of direct bonded magnesia chrome refractories for RH Degasser
Ghosh, B., TRL Krosaki Refractories Ltd. (Belpahar, IN)

P 64  Performance improvement of steel ladle MgO–C refractories by using novel carbon additives
Ghosh, B., TRL Krosaki Refractories Ltd. (Belpahar, IN)

P 65  Effect of firing temperature on thermo-mechanical properties of Low Cement Castables
Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

P 66  Influence of Pitch Type on Properties of Blast Furnace Trough Castable
Kanagawa, T., (Bizen-shi, Okayama, JP)

P 67  Understanding how the binder system influences the properties and process performance indicators of taphole clays
Garbers-Craig, A., University of Pretoria (Pretoria, ZA)

P 68  Modifications in Ladle Slide Gate System for improving Safety & Productivity
Ali, S., TRL Krosaki Refractories Ltd. (Belpahar, IN)

P 69  Performance of Novel Silica Dry Vibrating Refractory Lining Mixes without pure Boric Acid or Boron Oxide in Crucible Induction Furnaces in the Iron Foundries
Atanga, V., Dörentrup Feuerfestprodukte GmbH & Co. KG (Dörentrup, DE)

P 70  Transmission conditions across a thin Thermoelastic interphase
Pande, S., Università degli Studi di Trento (Trento, IT)

P 71  Alumina/aluminum titanate based model refractory material: a promising microstructural design to enhance thermal shock resistance
Mouiya, M., Université de Limoges (Limoges, FR)

P 72  Microstructure Design of a more Sustainable Alumina-spinel Refractory Castable
Booteng, K., Imerys S.A. (Vaulx Milieu, FR)

P 74  Discrete Element Method (DEM) to support microstructure design of refractories
Ranganathan, H., Imerys Technology Center (Vaulx Milieu, FR)
POSTERS

P 75  Hydrogen induced attack of Al₂O₃–SiO₂ refractories – application of SEM techniques and thermodynamics  
Henn, I., University of Koblenz (Koblenz, DE)

P 76  Study on Chrome–free purging plug for steel ladles  
Klaus, S., Almatis GmbH (Frankfurt, DE)

P 77  Online repairing of Blast furnace trough to enhance hot metal throughput  
Samanta, A., TRL Krosaki Refractories Ltd. Gumadera (Belpahar, IN)

P 78  Design of Self–Flow castable using SioxX (TM) – Flow and its ageing analysis in tropical condition  
Mishra, A., Elkem South Asia Pvt. Ltd. (Nagpur, IN)

OUR REFRACTORY INFO-TRAILER
Preparation Technology for Refractory Materials

From the initial consultation to the turnkey system, we are your competent partner with broad know-how and decades of experience.

Mixers and complete systems for:
- Castables
- Prefabricated parts
- Granules for isostatic pressing
- Granules, e.g. ZrO2
- Press bodies for all types of bricks, including hot mixture

eirich.com
SPECIAL EVENTS

WOMEN@REFRACTORIES

Wednesday, 27th September
Start 6.00 PM - 10.00 PM, room Sirius (1st floor)

Glass ceiling or sticky floor? Get your leadership inspiration you did not know you need!

Connect and exchange with the female force of the refractory industry. Women in research, science and the industry itself are thriving and on the rise. At RHI Magnesita the share of senior leadership positions held by females is 19%.

With the “Women@Refractories” event, RHI Magnesita aims to co-create with each and every one of you a networking and exchange platform for everyone interested.

The informal event will be hosted by four of our talented female leaders with different professional and personal backgrounds. We want to share a stage with you to talk about different career paths, the highlights as well as the challenges, and experiences as a minority in the refractory industry.

The event is open to every participant of the UNITECR 2023, no matter your gender identity!

Join us and our four female hosts on the 27th September 2023 for an inspiring & empowering apéro – drinks, snacks and conversations included.

YOUNG PROFESSIONALS

Thursday, 28th September
09.00 AM - 05.00 PM, room Komet, REFRAup Lounge (3rd Floor)

Invitation to the participating students to meet with representatives of the sponsor in the REFRAup Lounge and to discuss the latest developments, e.g. virtual reality.

There you will find info, games, fun, snacks, and an invitation to the Conference Dinner in the Palmengarten at the exclusive REFRAup table.

You will be able to collect a few first impressions of the Refratechnik world, and with a bit of luck and skill you might even win the latest console.

GUSTAV EIRICH AWARD

Thursday, 28th September
11.00 AM, room Meridian

The aim of this award is to promote ideas and, at the same time, to support young talents in technical disciplines. The Gustav Eirich Award is a contribution to the long-term success of companies in the refractories production and application industries.

The Gustav Eirich Award is presented for the three best dissertations (Ph.D. theses) or equivalent work in the field of refractories that have been completed no longer than two years ago.

During the session, the three winners will present their work in 20 minute lectures.
Prefabricated Slag Door Solution
To Solve a Well Known Obstacle to Increase EAF Performance

29. September
10.20 am
Room
4 Horizont

mayerton.com
POSTERS

POSTER WALK
Submitted posters are mounted on pinboards in the poster exhibition (1st floor, poster area) and can be viewed all day.

POSTER SLAM
Wednesday, 27th September
04.40 PM
At the SLAM, registered authors will present the main technical features of their work in one minute and invite visitors to visit their own poster in the poster area.

POSTER AWARD CEREMONY
Wednesday, 27th September
06.00 PM
The jury will evaluate the 3 best presentations in terms of their successful short presentation. After a round of evaluation, the AWARD ceremony will take place at 6.00 PM.

The poster WALK will start directly after the AWARD ceremony. Refreshments and pretzel snacks will be served during the tour of the poster exhibition.

Moderation: Prof. Dr. Christos G. Aneziris and Dr. Christian Dannert
Jury: Chris Parr (Imerys, Chair), Jens Sperber (STEULER), Karin Scharrer (refractories WORLDFORUM)

SPECIAL THANKS TO

SPONSOR OF THE DAY
Food & Beverage on Wednesday. Each participant should drink 2–3 liters daily. Food connects. Important things are discussed over a meal. About business, sports or politics, the family or the respective hobbies.

CONFERENCE BAGS
Each conference attendee will receive a conference bag containing various informational material about the conference. The bag will be handed out in the main entrance foyer.

LANYARDS
Each conference participant has received a lanyard to attach their name badge to.

All participants are urgently asked to wear this lanyard with the name badge, as it gives proof of a valid day ticket at the dispensing stations for drinks and lunch. The Conference Ticket also applies to access to the conference dinner in the Palmengarten.

WRITING PADS AND PENS
Each participant has received his/her conference bag a writing pad as well as a pen.
The Integrated Refractory Education System (IRES) supports the development of young school leavers across all levels of vocational education and training, from basic apprenticeship courses through to graduate and doctorate programmes. The Koblenz University of Applied Sciences offers a complementary vocational programme that leads to the degree of Master of Science in ceramic engineering. This cluster of expertise in conjunction with the close-collaborative relationship maintained with the University and the Ceramic Education and Research Centre (BFZK) offers a unique combination of training and research that enables students to write their theses in the companies where they later find professional opportunities. Both bachelor's and master's students have excellent opportunities on the job market.

BFZK offers with its 8 institutes in Höhr-Grenzhausen a combination of facilities that is unique in the world, all of which deal with the topic of training and further education within the ceramic industry. The Montabaur vocational school, with its ceramic branch, is one of the dual partners in ceramic initial training and teaches the necessary theoretical knowledge for successful completion as a skilled worker in industry or as a journeyman in the trade. Further training as a ceramic technician or designer at the technical colleges for ceramic technology and ceramic design is then just as possible as studying for a bachelor's or master's degree in engineering – materials engineering, ceramics and glass – at the Westerwald campus. Furthermore, with the Bachelor of Science in ceramic engineering, ceramic technology and ceramic design at the University of Applied Sciences, students are given the opportunity to work together with other companies in the ceramic industry and to write their theses in the companies where they later find professional opportunities. Both bachelor's and master's students have excellent opportunities on the job market.

BFZK offers with its 8 institutes in Höhr-Grenzhausen a combination of facilities that is unique in the world, all of which deal with the topic of training and further education within the ceramic industry. The Montabaur vocational school, with its ceramic branch, is one of the dual partners in ceramic initial training and teaches the necessary theoretical knowledge for successful completion as a skilled worker in industry or as a journeyman in the trade. Further training as a ceramic technician or designer at the technical colleges for ceramic technology and ceramic design is then just as possible as studying for a bachelor's or master's degree in engineering – materials engineering, ceramics and glass – at the Westerwald campus. Furthermore, with the Bachelor of Science in ceramic engineering, ceramic technology and ceramic design at the University of Applied Sciences, students are given the opportunity to work together with other companies in the ceramic industry and to write their theses in the companies where they later find professional opportunities. Both bachelor's and master's students have excellent opportunities on the job market.

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SIGHTSEEING

VISIT TO EBERBACH MONASTERY

Wednesday, 27th September
10.30 AM – 03.00 PM
Start and finish: Kap Europa

The shuttle bus from Kap Europa will take you directly to the former Cistercian Monastery of Eberbach near Eltville next to the river Rhine, which is famous for its vineyards.

The monastic complex with its Romanesque and early Gothic buildings is one of the most important art monuments in Europe. With 900 years of monastic history, there is a lot to tell. During a guided tour through the buildings and outside areas you will learn, exciting and entertaining facts about the life of the monks, the changing history of the monastery and its current use.

Afterwards, a rustic lunch is set for you in the cloister tavern. Of course, you can also taste the unique quality wines from the monastery-owned vineyards, before going back to Frankfurt around 02.30 p.m.

CITY TOUR FRANKFURT MAIN /
GUIDED BUS TOUR

Thursday, 28th September
10.00 AM – 11.30 AM
Start and finish: Kap Europa

Tour through Frankfurt on the city’s development from the medieval period to the present day and on the connection between old and modern Frankfurt, with exciting details about interesting buildings and future projects.

PLEASE CHECK WITH THE ONSITE REGISTRATION COUNTER AT KAP EUROPA FOR AVAILABILITY.
INDUSTRY EXHIBITION

LEVEL 1

MEDIA PARTNERS

<table>
<thead>
<tr>
<th>BOOTH</th>
<th>MEDIA PARTNER</th>
<th>CONTACT</th>
<th>E-MAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>American Ceramic Society bulletin</td>
<td>Pam Wilson</td>
<td><a href="mailto:pwillson@ceramics.org">pwillson@ceramics.org</a></td>
</tr>
<tr>
<td>M2</td>
<td>stahl+technik DVS-Verlag</td>
<td>Katrin Küchler and Claudia Wolf</td>
<td><a href="mailto:k.kuechler@dvs-media.info">k.kuechler@dvs-media.info</a></td>
</tr>
<tr>
<td>M3</td>
<td>China’s Refractories</td>
<td>Wang Jing</td>
<td><a href="mailto:chnr@nhcl.com.cn">chnr@nhcl.com.cn</a></td>
</tr>
<tr>
<td>M4</td>
<td>Institute of Ref. Engineers</td>
<td>Andrew Turner</td>
<td><a href="mailto:advertising@ireng.org">advertising@ireng.org</a></td>
</tr>
<tr>
<td>M5</td>
<td>Refractory Window</td>
<td>Cathy Zhang</td>
<td><a href="mailto:cathy@refwin.com">cathy@refwin.com</a></td>
</tr>
<tr>
<td>M6</td>
<td>stahl. Vulkan Verlag</td>
<td>Sarah Gottschalk</td>
<td><a href="mailto:redaktion.stahl@vulkan-Verlag.de">redaktion.stahl@vulkan-Verlag.de</a></td>
</tr>
<tr>
<td>M7</td>
<td>STEEL + Metalurgy</td>
<td>Pradipta Sengupta</td>
<td><a href="mailto:pradipta@steelmetallurgy.com">pradipta@steelmetallurgy.com</a></td>
</tr>
<tr>
<td>M8</td>
<td>marketSTEEL</td>
<td>Dagmar Dieterle</td>
<td><a href="mailto:dieterle@marketsteel.de">dieterle@marketsteel.de</a></td>
</tr>
<tr>
<td>M9</td>
<td>IMFORMED</td>
<td>Mike O’Driscoll, Ismene Clarke</td>
<td><a href="mailto:ismene@imformed.com">ismene@imformed.com</a>, <a href="mailto:mike@imformed.com">mike@imformed.com</a></td>
</tr>
<tr>
<td>M10</td>
<td>Refractories Worldforum</td>
<td>Karin Scharrer and Corinna Zepter</td>
<td><a href="mailto:k.scharrer@goeller-verlag.de">k.scharrer@goeller-verlag.de</a></td>
</tr>
<tr>
<td>M11</td>
<td>ZKG Bauverlag</td>
<td>Anke Bracht</td>
<td><a href="mailto:anke.bracht@bauerlag.de">anke.bracht@bauerlag.de</a></td>
</tr>
<tr>
<td>M12</td>
<td>Iron &amp; Steel Review</td>
<td>Santosh Mahanti</td>
<td><a href="mailto:contact@isrinfomedia.in">contact@isrinfomedia.in</a></td>
</tr>
</tbody>
</table>
INDUSTRY EXHIBITION

LEVEL 2

LEVEL 4

Booth
Media Partners
Posterwall

Catering

Mistral
Meridian 1
Orient
Seating for catering
Meridian 2
Okzident
Seating for catering

Horizont

Stratus 1
Lounge
Stratus 2
Lounge

Sirius
Seating for catering / lectures

Plateau 1
Plateau 2

Solar 1
Lounge
Solar 2
Lounge
## INDUSTRY EXHIBITION

<table>
<thead>
<tr>
<th>BOOTH NUMBER</th>
<th>COMPANY NAME AND ADDRESS</th>
<th>SHORT PROFILE</th>
</tr>
</thead>
</table>
| 101          | Washington Mills  
64 Mosley Road, Trafford park  
Manchester M32 8JD  
United Kingdom | Washington Mills is a family-owned company, committed to the long-term success of the enterprise. We offer solutions to fused mineral, abrasive grain and powder requirements. |
| 102/103      | Almatis GmbH  
Lyoner Straße 9  
60528 Frankfurt/Main  
Germany | Almatis has the broadest alumina portfolio to the refractory industry and is committed to develop products with lower carbon footprint and sustainable advantage. |
| 104          | Thyme Europe Limited  
1 Northumberland Avenue Trafalgar Square  
London WC2N 5BW  
United Kingdom | Versatile supplier of industrial minerals for refractory, abrasive, aluminium, ceramics. Comprehensive sourcing, quality inspection, logistics, and financing solutions |
| 105          | Chemische Fabrik Budenheim KG  
Rheinstraße 27  
55257 Budenheim  
Germany |                                                                                                                                                  |
| 106          | ShengChuan Advanced Material Technology Co. Ltd, NieuwCun, LuoCun Town  
ZiChuan District, ZiBo City  
ShanDong Province  
China | ShengChuan AMT is top CAC manufacturer in China. VICAL ® is refractory brand, customers’ reliable choice for the stable performance & technical services. |
| 107/108      | PENNEKAMP MIDDLE EAST  
Office 30C-09  
I-Rise Tower  
TECOM, DUBAI, UAE | Supplying Refractories raw materials and Refractories finished products.                                                                       |
| 109/110      | Fiven GmbH  
Gertrudenstraße 30–36  
50667 Köln  
Germany | Fiven is the global leader in the production of Silicon Carbide (SiC). We produce grains & powders for the refractory, metallurgical, abrasive and technical ceramics industry. |
| 111          | ESK-SIC GmbH  
Günter-Wiebke-Strasse 1  
50226 Frechen  
Germany |                                                                                                                                                  |
| 112          | Rain Carbon Germany GmbH  
Kekuléstr. 30  
44579 Castrop–Rauxel  
Germany | Rain Carbon offers the complete range of carbon binders to produce shaped and monolithic refractories: CARBORES®; PETRORES®, Impregnation Pitch |
| 113          | ALAFAR  
Asociación Latinoamericana de Fabricante de Refractarios  
Contagem, Minas Gerais  
Brasil |                                                                                                                                                  |
| 114          | 4D Delta  
1/216 Fulham St, Cloverdale WA 6105  
Australia |                                                                                                                                                  |
<table>
<thead>
<tr>
<th>CONTACT</th>
<th>WEBSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dave Parker</td>
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<td>+44 7973 846774</td>
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<td>Verena Auguste</td>
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<td>+49 152 2323 6050</td>
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<td><a href="mailto:verena.auguste@almatis.com">verena.auguste@almatis.com</a></td>
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<tr>
<td>Devang Chowdhary</td>
<td><a href="http://www.thymeeuro.com">www.thymeeuro.com</a></td>
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<td><a href="mailto:devang@thymeeuro.com">devang@thymeeuro.com</a></td>
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<td>+86-13070660465</td>
<td></td>
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<tr>
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<tr>
<td><a href="mailto:masoud@pennekamp-me.ae">masoud@pennekamp-me.ae</a></td>
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<tr>
<td>Fiven</td>
<td><a href="http://www.fiven.com">www.fiven.com</a></td>
</tr>
<tr>
<td>Christoph Jacob</td>
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<td>+49 1624246862</td>
<td></td>
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<tr>
<td><a href="mailto:christoph.jacob@raincarbon.com">christoph.jacob@raincarbon.com</a></td>
<td></td>
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<tr>
<td><a href="mailto:sirefmg@fiemg.com.br">sirefmg@fiemg.com.br</a></td>
<td></td>
</tr>
<tr>
<td>+ (55 31) 3368-1123</td>
<td></td>
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<tr>
<td>Don Merritt</td>
<td><a href="http://www.4ddelta.com">www.4ddelta.com</a></td>
</tr>
<tr>
<td><a href="mailto:don.merritt@4ddelta.com">don.merritt@4ddelta.com</a></td>
<td></td>
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</tbody>
</table>
## INDUSTRY EXHIBITION

<table>
<thead>
<tr>
<th>BOOTH NUMBER</th>
<th>COMPANY NAME AND ADDRESS</th>
<th>SHORT PROFILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>HÄNDLE GmbH Maschinen- und Anlagenbau Industriestr. 47 75417 Mühlacker Germany</td>
<td>For more than 150 years, HÄNDLE is one of the leading manufacturers of machinery and equipment for a wide range of building materials industries in over 100 countries worldwide.</td>
</tr>
<tr>
<td>116</td>
<td>IMCE NV Slingerweg 52 Poort Genk 5489 3600 Genk Belgium</td>
<td>RFDA measurement equipment for NDT material characterization, accurately determining elastic properties at room and elevated temperatures up to 1700°C.</td>
</tr>
<tr>
<td>117</td>
<td>Refmin</td>
<td></td>
</tr>
<tr>
<td>118/119</td>
<td>Alteo</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>Nissin Kikai Co., Ltd. 744-1 Ichinomiya-cho Takamatsu-City Kagawa-Prefecture Japan</td>
<td>We develop and sell high-temperature material property evaluation and visualization equipment.</td>
</tr>
<tr>
<td>121</td>
<td>• German Refractory Association (DFFI) • Deutsches Institut für Feuerfest und Keramik (DIFK) • European Centre for Refractories (ECREF) • Forschungsgemeinschaft Feuerfest e. V. (FGF)</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>Koblenz University of Applied Sciences Rheinstr. 56 56203 Höhr-Grenzhausen Germany</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td>TU Bergakademie Freiberg Institut für Keramik, Feuerfest und Verbundwerkstoffe Agricolastraße 17 09599 Freiberg Germany</td>
<td></td>
</tr>
</tbody>
</table>

### Lounge 1.1
Almatis GmbH

### Lounge 1.2
Cofermin Rohstoffe GmbH + Co KG (Wednesday, 27th September and Thursday, 28th September only)

### Lounge 1.3
Imerys

### Lounge 1.4
Zhejiang Zili Advanced Materials Co., Ltd (Wednesday, 27th September only) IMEXCO Minerals GmbH (Thursday, 28th September only)
<table>
<thead>
<tr>
<th>CONTACT</th>
<th>WEBSITE</th>
</tr>
</thead>
</table>
| Christina Eid  
+49 7041 891-271  
c.eid@haendle.com | www.haendle.com |
| Bart Bollen  
+32 89 41 00 70  
Bart.bollen@imce.net | www.imce.net |
| sales@nissin-kikai.co.jp | www.nissin-kikai.co.jp |
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office@ecref.eu | www.dffi.de  
www.difk.de  
www.ecref.eu  
www.fg-feuerfest.de |
| Tina Klersy  
+49 2624 9109-16  
klersy@hs-koblenz.de | www.hs-koblenz.de |
| Dr.-Ing. habil. Patrick Gehre  
+49 3731 39-2709  
patrick.gehre@ikfvw.tu-freiberg.de | www.ikfvw.tu-freiberg.de |
## INDUSTRY EXHIBITION

<table>
<thead>
<tr>
<th>Booth Number</th>
<th>Company Name and Address</th>
<th>Short Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Shandong Higiant High-purity Alumina Technology Co. Ltd. Guozhuang Industry Zone Linchi Town, Zouping County Binzhou, China</td>
<td>We have been focusing on high purity alumina based raw material with stable quality for refractory industry since its foundation in 2007.</td>
</tr>
<tr>
<td>202/203</td>
<td>IMERYS 43 Quai de Grenelle 75015 Paris France</td>
<td>As the world’s leading supplier of mineral-based specialty solutions, Imerys delivers its high-quality &amp; reliable products to the global refractory industry.</td>
</tr>
<tr>
<td>204</td>
<td>Maschinenfabrik Gustav Eirich GmbH &amp; Co KG Walldürner Straße 50 74736 Hardheim Germany</td>
<td>Eirich is a family–managed group of companies operating in the field of special mechanical engineering for mixing, granulating, dispersing &amp; kneading.</td>
</tr>
<tr>
<td>205 - 207</td>
<td>LAEIS GmbH Am Scheerleck 7 68688 Wecker Luxembourg</td>
<td>LAEIS is a world leading supplier of high performance hydraulic presses for the production of refractories, technical ceramics and various other applications</td>
</tr>
<tr>
<td>208</td>
<td>Schleibinger Geräte Teubert u. Greim GmbH Gewerbestr. 4 84428 Buchbach Germany</td>
<td>We develop and manufacture testing systems for building materials in the field of workability and rheology, shrinkage and expansion, freeze–thaw resistance and ASR–reaction.</td>
</tr>
<tr>
<td>209</td>
<td>Henneke Formbau GmbH Am Mühlengraben 4 58849 Herscheid Germany</td>
<td>Mold making for the refractory industry for any Precast elements and bricks, f.ex. Burner, nozzle bricks or Gutter components. Formwork and cores made of polystyrene or wood etc.</td>
</tr>
<tr>
<td>210</td>
<td>Nouryon AB Gamlestadsvägen 18 B–C SE–415 02 Göteborg Sweden</td>
<td>Nouryon is a global, specialty chemicals leader. Our Levasil® colloidal silica works as an excellent binder for both alumina and magnesia refractories</td>
</tr>
<tr>
<td>212</td>
<td>Refra System</td>
<td></td>
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<tr>
<td>Booth Number</td>
<td>Company Name and Address</td>
<td>Short Profile</td>
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<tr>
<td>201</td>
<td>Shandong High-purity Alumina Technology Co. Ltd.</td>
<td>Guozhuang Industry Zone, Linchi Town, Zouping County, Binzhou, China</td>
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<tr>
<td>202/203</td>
<td>IMERYS</td>
<td>43 Quai de Grenelle, 75015 Paris, France</td>
</tr>
<tr>
<td>204</td>
<td>Maschinenfabrik Gustav Eirich GmbH &amp; Co KG</td>
<td>Walldürner Straße 50, 74736 Hardheim, Germany</td>
</tr>
<tr>
<td>205 - 207</td>
<td>LAEIS GmbH</td>
<td>Am Scheerleck 7, 6868 Wecker, Luxembourg</td>
</tr>
<tr>
<td>208</td>
<td>Schleibinger Geräte Teubert u. Greim GmbH</td>
<td>Gewerbestr. 4, 84428 Buchbach, Germany</td>
</tr>
<tr>
<td>209</td>
<td>Henneke Formbau GmbH</td>
<td>Am Mühlengraben 4, 58849 Herscheid, Germany</td>
</tr>
<tr>
<td>210</td>
<td>Nouryon AB</td>
<td>Gamlestadsvägen 18 B-C, SE-415 02 Göteborg, Sweden</td>
</tr>
<tr>
<td>211</td>
<td>ARCIRESA.- ARCILLAS REFRACTARIAS S.A</td>
<td>Castiello sn 33690 Lugo de Llanera, Spain</td>
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<th>BOOTH NUMBER</th>
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<tr>
<td><strong>Level 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lounge 3.1</td>
<td>Bosai Europe GmbH</td>
<td></td>
</tr>
<tr>
<td>Lounge 3.2</td>
<td>REFRAup Lounge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refratechnik Holding GmbH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hindalco Industries Limited</td>
<td>(Thursday, 28th September only)</td>
</tr>
<tr>
<td>Lounge 3.3</td>
<td>ELKEM GmbH</td>
<td></td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>401</td>
<td>Bosai Europe GmbH</td>
<td>Supply the world – together. Bosai Europe is your producer and partner for Bauxite and Alumina raw materials.</td>
</tr>
<tr>
<td>402/403</td>
<td>Steuler Refractory Linings Berggarten 1 56427 Siershahn Germany</td>
<td>Steuler Refractory Linings is one of the international innovation and market leaders in the field of refractory systems.</td>
</tr>
<tr>
<td>404</td>
<td>CREMER ERZKONTOR GmbH &amp; Co. KG Beckergrube 38-52 23552 Lübeck Germany</td>
<td>Founded in 1915, CREMER ERZKONTOR coordinates the international trade, processing, recycling and logistics of raw materials and chemicals with offices on five continents.</td>
</tr>
<tr>
<td>405/406</td>
<td>Purmetall GmbH &amp; Co. KG Niebuhrstr. 57 46049 Oberhausen Germany</td>
<td>PURMETALL develops, manufactures and distributes refractories, ladle well fillers, synthetic slags and covering powders for the global steel industry since more than 65 years.</td>
</tr>
<tr>
<td>407</td>
<td>Elkem Drammensveien 169 0277 Oslo Norway</td>
<td>Elkem is one of the world’s leading providers of advanced silicon-based materials shaping a better and more sustainable future.</td>
</tr>
<tr>
<td>408</td>
<td>VELCO GmbH Haberstr. 40 42551 Velbert Germany</td>
<td>Velco product range covers gunning machines for refractory dry gunning and gunning robots for the hot repair of EAF, ladles and RH-snorkels.</td>
</tr>
<tr>
<td>409/410</td>
<td>New He Qiao Shareholdings Company Minh Tan Ward Kinh Mon City Hai Duong Province Vietnam</td>
<td>We are New He Qiao, the first silicon carbide producer in Vietnam, and a major supplier in the global SiC market.</td>
</tr>
<tr>
<td>411/412</td>
<td>Nabaltec AG Alustr. 50-52 92421 Schwandorf Germany</td>
<td>Nabaltec AG manufactures, develops and distributes highly specialized products based on aluminium oxide and aluminium hydroxide.</td>
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zouyun@new-hq.com | www.nhqsic.com |
| Thomas Berens  
+49 9431 53-910  
sales@nabaltec.de | www.nabaltec.com |
The Business Association

The German Refractories Association (Deutsche Feuerfest-Industrie e.V. | DFFI), founded in 1949, represents and advances the interests of German manufacturers operating in the industry. The Association collaborates in networks to promote the economic and technological evolution of its member companies by putting forward the jointly adopted positions in both political and societal contexts. The Association gives a strong voice to the refractory industry – a sector largely dominated by small and medium-sized enterprises.

Advocacy | Network | Perception
Environment | Climate | Energy
Raw Material | Recycling
Knowledge | Education | Career

Refractory Organisations in Höhr-Grenzhausen

Service and Performance

The German Refractories Association represents and pursues the politico-economic interests of its member companies vis-à-vis public authorities and government bodies in both national and European contexts. The Association covers a broad spectrum of issues and activities: It provides comprehensive support and guidance in all matters pertaining to raw materials supply security, environment and energy policy as well as tax, law, research and technology, including questions relating to standardisation. Major German companies and international brand leaders have joined the Association, which for its part is a member of the national and European network of associations.

Refractory committee work on technical and environmental issues and participation in BBS, BDI or DIN and ISO.

European Cooperation (PRE and Cerame-Unie) is bundled and in dialogue with the European Institutions. World trade and regulatory issues are discussed in the World Refractories Association (WRA).

DFFI-Board

Managing Director: Thomas Kaczmarek

info@dffi.de
Managing Directors:
Dr. Christian Dannert | Thomas Kaczmarek

European Centre for Refractories gGmbH
Steering of standardization activities
Promotion of education and further training in the field of refractories
Operation of a European competence centre for refractory materials and technologies
Organization and realization of scientific seminars, colloquia and similar events
Talent programmes with the awarding of grants and awards for scientific work in the field of refractory products

info@ecref.eu

The International Colloquium on Refractories ICR® is a world-renowned event held annually in the city of Aachen. The event consists of a scientific conference, a trade fair for refractory companies and suppliers of raw materials, machinery, services and knowledge to the refractory industry, and of a varied supporting programm and social event.

Two days of scientific presentations and posters covering all aspects of the latest refractory research (raw materials, processing, refractory materials, applications and recycling)

Trade fair for refractory companies, customers and for suppliers of raw materials, machinery, services and knowledge to the refractory industry.

Knowledge Transfer

Education and Training

Scholarships

European Networking

Rheinstr. 58
56203 Höhr-Grenzhausen
Germany

+49 2624 94 33 100

www.dffi.de
The German Refractory Association (Deutsche Feuerfest-Industrie e.V. | DFFI), founded in 1949, represents and advances the interests of German manufacturers operating in the industry. The Association collaborates in networks to promote the economic and technological evolution of its member companies by putting forward the jointly adopted positions in both political and societal contexts.

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European Centre for Refractories gGmbH

- Operation of a European competence centre for refractory materials and technologies
- Promotion of education and further training in the field of refractories
- Organization and realization of scientific seminars, colloquia and similar events
- Talent programmes with the awarding of grants and awards for scientific work in the field of refractory products
- Steering of standardization activities

International Colloquium on Refractories (ICR)

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Two days of scientific presentations and posters covering all aspects of the latest refractory research (raw materials, processing, refractory materials, applications and recycling)

Trade fair for refractory companies, customer and for suppliers of raw materials, machinery, services and knowledge to the refractory industry.

Managing Directors: Dr. Christian Dannert | Thomas Kaczmarek

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56203 Höhr-Grenzhausen
Germany

info@ecref.eu

+49 2624 94 33 130

www.ecref.eu
Deutsches Institut für Feuerfest und Keramik GmbH

is an independent and international operating test laboratory for testing of refractory raw materials, refractory products like bricks, castables, insulating materials and functional parts and in the case of damage the testing of refractory systems.

The laboratory is accredited by DAkkS under registration number D-PL-17672-01-00 after DIN EN ISO / IEC / 17025:2005 and is able to carry out more than 100 standardized resp. specific test methods. In the process chemical, physical and mineralogical methods as well as selected high temperature measuring procedures are used according to the standards and rules of DIN, EN, ISO, ASTM API, JIS ABNT, CIR, etc.

Focussed on maximum customer orientation promptness and reliability are the main attributes of the manner of functioning of DIFK GmbH since more than 25 years. The experienced and consequently trained staff works together with best possible equipment of a modern laboratory. The consulting of the international customers for productive selection of the most suitable measuring methods is the focus of dialog to retain customer satisfaction.

Head of Laboratory: Dr.-Ing. Thomas Deinet

Rheinstr. 58
56203 Höhr-Grenzhausen
Germany

info@difk.de

+49 2624 94 33 200

www.difk.de
Deutsches Institut für Feuerfest und Keramik GmbH (DIFK) is an independent and international operating test laboratory for testing of refractory raw materials, refractory products like bricks, castables, insulating materials and functional parts and in the case of damage the testing of refractory systems.

Technical Advice

Standardized Testing

Customer Solutions

International Services

DIFK is accredited by DAkkS under registration number D-PL-17672-01-00 after DIN EN ISO / IEC / 17025:2005 and is able to carry out more than 100 standardized resp. specific test methods. In the process chemical, physical and mineralogical methods as well as selected high temperature measuring procedures are used according to the standards and rules of DIN, EN, ISO, ASTM API, JIS ABNT, CIR, etc.

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Head of Laboratory:
Dr.-Ing. Thomas Deinet

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56203 Höhr-Grenzhausen
Germany

www.difk.de
+49 2624 94 33 200
info@difk.de

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Forschungsgemeinschaft Feuerfest e. V.

Research and Innovation

Methods:
- Development of in situ testing methods for High Temperature Properties
- High temperature thermal shock behaviour
- High temperature gas/liquid corrosion (H2, H2O-vapour, slags, metals)
- High temperature elasticity and dynamic creep
- FEM simulations

Materials:
- Refractories, binder systems, secondary raw materials

Processes:
- Optimisation of shaping and firing processes

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Head of R&D: Dr. Christian Dannert

Rheinstr. 58
56203 Höhr-Grenzhausen
Germany

info@fg-feuerfest.de

www.fg-feuerfest.de
+49 2624 94 33 180
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