

refractories

WORLD FORUM

Hot Topics

Manufacturing & Performance of High-Temperature Materials

NEWSLETTER 1/2010

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Novel High-temperature Materials as a Basis for Innovative, Efficient Gasification Processes

Deutsches Energierohstoff-Zentrum (DER) Freiberg developing technologies for the post-oil era

Refractories are developed for entrained flow gasification and fluidized bed gasification. Here the material is exposed to extreme corrosion conditions. These include a highly reducing gas atmosphere containing carbon monoxide and hydrogen, with temperatures around 1300 °C and the presence of aggressive high-alkali liquid slags.

Since the beginning of this year, as part of a project set to run four years, the *Deutsche Energierohstoff-Zentrum* (German Energy Resources Centre) at *Freiberg University of Mining and Technology* has been researching and developing innovative concepts and technologies for the post-oil era.

The alliance partners from both science and business are working to substitute oil and natural gas through the use of coal and biomass. The material utilization of

these energy resources is at the centre of interest.

Refractories available today for these reactors have certain drawbacks. A new generation of refractories is developed for entrained flow gasification and fluidized bed gasification. Here the material is exposed to extreme corrosion conditions. These include a highly reducing gas atmosphere containing carbon monoxide and hydrogen, with temperatures around 1300 °C and the presence of aggressive high-alkali liquid slags.

On account of the highly reducing gas atmosphere, so far mainly chromium-containing, high-temperature-resistant refractories have been used. For environmental and price reasons, the target set is to go chrome-free. Another disadvantage is the inertness of these materials when heated due to their low thermal conductivity. At the comparatively low temperatures required for steam generation (maximum approx. 750 °C) in conventional fossil-fuelled power plants, this has led to a preference for temperature-resistant metals. In this connection, nickel is to mention with all its problems

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News on refractories WORLD FORUM 2011

This newsletter "**refractories WORLD FORUM - Hot Topics**" will be issued quarterly to update the readers on "Global News" between the regular issues. Furthermore previews on the next print issue will be given. The newsletter is also a tool to give details on upcoming major events and barter activities of our team.

We are also delighted to announce that next year refractories WORLD FORUM will be published quar-

terly (volume 1/2009: 2 issues, volume 2/2010: 3 issues). This will give us a larger editorial volume.

In addition, an online subscription will be available from now on.

For suppliers to the refractories community we are setting up the refractories suppliers directory. Until 31st December 2011 the on-line registration of product entries will be free of charge. Please visit:

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(price, availability in politically critical extraction regions, and lack of high compressive strength). In gasification it is possible to manage without the problematic high-temperature steels as a "mass material" for steam generation. The project is concentrating now on low-price and rugged ceramic based on Al_2O_3 , MgO and CaO basis. The materials developed will be tested and assessed in respect of their microstructure, thermal shock and corrosion resistance. Castable materials are preferred as this not only avoids joints in the lining, but enables the production of complex shapes. The heating of the masonry has to reach at least 500 K/h. The actual aim would be 1000 K/h, which could be possible with carbon-bonded refractories.

In a sub-project also SiC and AlN are considered, e.g. for burner nozzles. AlN is particularly interesting as a coating material for burners.

Another notable thing about this project, which is funded with EUR 16 million by Germany's Federal Ministry of Education and Research (BMBF) and industry, is the linking of technical and business research focuses.

Besides the three technical disciplines (structural analysis of energy resources, development of innovative high-temperature ceramics, development of innova-

tive gasification processes), economic lines of research are pursued, which examine the conditions and principles for sustaining complex innovative cooperation networks and ensure knowledge transfer from leading research centres by setting up professional schools (interdisciplinary and application-oriented centres of expertise).

Knowledge transfer includes both exchange between the research partners involved, especially between the university and business, as well as the specific support of the students and young professionals enabled by this, but also to the further development of seasoned professionals and executives. Closely associated with this is the concept of lifelong learning, which is growing in importance owing to technological advances and change as well as especially demographic developments in Germany and worldwide. The special incentives from the point of view of the companies is to get involved with the setting up and concept of a "Professional School" from the start and thus to tailor the learning to the needs of their own target groups, so as to remain competitive on an international level.

The cooperation of departments from business and technology is nothing new in Freiberg. The FIRE (Refractories Initia-

tive to Reduce Emissions), a special programme of research initiated last year and funded by the DFG with EUR 18 million over six years is also supported by the Department of Marketing and International Trade. This included the working out and communication of an integrative research roadmap for refractories.

At Freiberg University of Mining and Technology, new paths are taken to transfer technical innovations efficiently, in "real-time" and sustainably (including support of young professionals, application-oriented and interdisciplinary further training) from university into business.

Further details will be reported in an interview held with Chancellor of Freiberg University of Mining and Technology Professor Dr.-Ing. Bernd Meyer in the coming issue **refractories WORLDFORUM 3 (2011) [1]**. He is chairman and spokesman of the DER steering committee.

Also a report on FIRE – Refractories Initiative to Reduce Emissions will be published in the coming issue.

We hope that we have inspired your interest for the next issue (more details see page 4) published on 07.01.2011 in print and on-line.

KS

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Germany

GIFA, METEC, THERMPROCESS and NEWCAST 2011

The four international technology trade fairs GIFA (International Foundry Trade Fair), METEC (International Metallurgical Technology Trade Fair), THERMPROCESS (International Trade Fair for Thermo Process Technology) and NEWCAST (International Trade Fair for Precision Castings) are held from 28 June to 2 July 2011 in Düsseldorf. Under the motto "The Bright World of Metals" the topics foundry technology, metallurgical technology, thermal process engineering and cast products will again be at the focus of global attention. They will be supported by a high-calibre programme of side events including numerous seminars, international congresses and lecture series. The focus of all four trade fairs and the accompanying events are energy and resource efficiency.

At its latest staging in 2007 GIFA, METEC, THERMPROCESS and NEWCAST posted a total of 1700 exhibitors from 34 countries and about 72 000 international guests from 84 nations. The net area occupied totalled 68 000 m². For 2011 the organisers expect a similarly high turn-out.

Further information: www.gmtf.de; www.gifa.de; www.metec.de; www.thermprocess.de; www.newcast.de

Germany

New Dates for CERAMITEC: 22 – 25 May 2012

The new dates for CERAMITEC 2012 have been fixed. The 12th International Trade Fair for Machinery, Equipment, Plants, Processes and Raw Materials for Ceramics and Powder Metallurgy will take place from 22 – 25 May 2012 at the New Munich Trade Fair Centre. These spring dates tie in again with CERAMITEC 2006.

CERAMITEC is an innovations platform for the entire spectrum of the ceramics industry. Even in the recession year of 2009 CERAMITEC succeeded in attracting a total of 656 companies from 35 countries, which represents an increase over the previous time the fair was held (2006: 612 exhibitors).

In 2009 the fair also accounted for around 15 000 trade visitors from 84 countries. The international proportion was almost 60 %.

After Germany, the country from which the largest contingent of participants (exhibitors and visitors) came was Italy.

Alongside coverage of the traditional ceramic areas, the sections on Technical Ceramics and Advanced Ceramics will be further expanded for CERAMITEC 2012, in order to present to exhibitors and visitors an even broader product portfolio.

Contact: www.ceramitec.de.

Russia

International Conference of Refractory & Metallurgy Experts 2011

International Metallurgists Union organizes the annual international conference of refractory and metallurgy experts on March 31 March to 01 April 2011 in the Russian Academy of Government Service (Moscow, Prospect Vernadskogo, 84). The Conference is organized under assistance of the *Magnezit Group* and *Intermet Engineering*.

Representatives practically of all refractory and the majority of metallurgical enterprises and companies of Russia, CIS, foreign countries, and also the companies dealing with raw materials and equipment, research and educational institutes will take part in the conference, with an expected number of about 250 participants.

Subjects of conference are:

- The use of new refractories in ferrous and non-ferrous metallurgy
- Technologies, raw materials and equipment for refractories.

Conference fee EUR 500 per person (information materials, coffee breaks, le fourchet, banquet are included).

Further information: info@imet.ru

Czech Republic

International Conference on Refractories 2011 in Prague

The *Czech Silicate Society* in cooperation with the *Institute of Ceramic, Glass and Construction Materials of TU Bergakademie Freiberg*, with the association *MORE – Meeting of Refractory Experts Freiberg* and with the *Association of Czech and Slovak Refractories Producers* are pleased to host the 17th International Conference on Refractories to be held on 10 – 11 May 2011 in Prague. The technical programme will be organized simultaneously in two sections:

A. Theoretical principles of technological processes: session only in English

B. Technology and application of refractories: simultaneous translation Czech, Slovak, English, German. Submission of abstracts is required till 30 November 2010. Proceedings: Manuscripts of papers in English must be submitted till 14 March 2011.

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USA

MIM 2011 – International Conference on Injection Molding of Metals, Ceramics and Carbides

The PIM industry (MIM – metal injection molding; CIM – ceramic injection molding; and CCIM – cemented carbide injection molding) has estimated sales of over USD 1 billion and could possibly double in a span of five years. The objective of the conference is to explore innovations and latest accomplishments in the areas of part design, tooling, molding, debinding, and sintering of PIM parts. The conference will also focus on the developments in PIM processing of different materials including metals and alloys, ceramics, and hard materials. With its focus on "Best Manufacturing Practices" the conference is targeted at product designers, engineers, consumers, manufacturers, researchers, educators, and students. All individuals with an interest in the application of powder injection molding will be encouraged to attend. Deadline for abstract submission is 31 August 2010. More information: www.mpif.org

Norway

Dagfinn Winterstø Appointed New Business Director

Elkem Silicon Materials, Norwegian-based global supplier of microsilica and silicon products for the refractories industry, has appointed Mr *Dagfinn Winterstø* as new Business Director Refractories. Dagfinn has worked at Elkem in a variety of challenging positions around the world for more than 30 years. His

main focus areas are customer orientation and new product development. He believes that the new SioxX® line of specialties for unshaped refractories will be well-received by customers, and further help the industry in developing improved products for the future.

Great Britain

Unifrax Acquired Brightcross Manufacturing

Unifrax, the Niagara Falls/US based manufacturer of ceramic fiber insulation products, announced that its UK subsidiary, *Unifrax Ltd*, has completed the acquisition of *Brightcross Manufacturing Ltd* and *Brightcross Insulation Ltd*. Brightcross, located in Derby/GB, was established by Principals *David Gill*, *Phil Hodgson* and *James Corbett* in 1982. It is the leading supplier of vacuum formed ceramic fiber shapes in the UK and also does a substantial amount of export business into the EU. They produce over 2000 different products and are a major supplier to the European foundry and domestic appliance markets. Messrs. Gill, Hodgson and Corbett will continue to be associated with the business in a consulting capacity. Brightcross has approximately 60 employees who have joined the Unifrax Europe Operations team. Terms of the transaction are confidential.

Germany

Ground breaking ceremony for ECREF

The financial support available from the state government of Rhineland-Palatinate/DE with moneys from European funds has paved the way for a new *European Centre for Refractories (ECREF)* to be established in Höhr-Grenzhausen. This project is coupled with the simultaneous expansion of the *FGK Forschungsinstitut für anorganische Werkstoffe Glas/ Keramik GmbH* (Research Institute for Inorganic Materials) and the setting up of the *ECREF (European Centre for Refractories)* at the same location. The European refractories industry will thus have access to a campus for research activities close to both Koblenz's *University of Applied Sciences* in Höhr-Grenzhausen, with its research institute for materials engineering / glass and ceramics and also the *Koblenz University* itself. Chairs have been newly established for Materials Analysis at the University of Applied Sciences and for Technical Chemistry and Corrosion Sciences at the University of Koblenz's Institute for Integrated Sciences. This has laid the foundation for a joint Master's Degree Programme in Ceramic Science and Engineering. The ground breaking ceremony took place 25 November 2010.

United Arab Emirates

Emirates Steel Expansion

Emirates Steel Industries PJSC, the state-owned company that operates the largest steel plant in the

United Arab Emirates, received a USD 1,1 billion loan from a group of regional banks as it seeks to expand output. Emirates Steel is using the funds to finance a production expansion. The steelmaker aims to boost output in two phases to about 6,5 Mt/a by about 2015.

Norway

Hydro Increases Improvement Ambition

Hydro's ambition to improve earnings from its wholly owned smelters by USD 100 per tonne is now being increased to USD 300 per tonne. The measures aim to improve the aluminium smelters' competitiveness and restore profitability to a sustainable level.

In the autumn of 2009, *Hydro* launched a cost improvement program in order to reduce operating costs by USD 100 per tonne of primary aluminium produced by the end of 2011, compared to the 2009 level. The program is on schedule. The autumn 2009 program to reduce costs by USD 100 per tonne has been focusing on operational improvements, where a more stable operation of aluminium production means lower production costs. The existing improvement program will now be extended, and primary metal will improve efficiency, implement improvements and reduce costs in areas such as purchasing, logistics, technology, manning and organization. In addition, the aim is to obtain a further improvement from margins on metal products from the smelter casthouses – in total, USD 300 per tonne in improvements when all measures are identified and implemented. The improvement program will focus on costs which are able to be influenced, mainly so-called conversion costs, in *Hydro's* wholly owned aluminium smelters. The improvements do not include the effect of somewhat higher energy

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costs in coming years, or fluctuations in raw material prices and other input factors.

India

HINDALCO in Expansion Mode

Kumar Mangalam Birla, Chairman of Hindalco, at the company's Annual General Meeting said that Aditya Birla Minerals Ltd., the company's Australian subsidiary, had witnessed a turnaround as well, largely due to sustained cost management processes. It reported a PAT of AUD 61,4 million vis-à-vis a loss of AUD 76 million in the earlier year. Mr Birla discussed Hindalco's brownfield expansion projects, stating that the smelter expansion at Hirakud from 155 000 t/a to 161 000 t/a was under progress and was slated for completion in the second quarter of financial year 2011. Further capacity expansion to 213 000 t/a, through the addition of 80 pots, is underway and expected to be completed by Q4 of 2012. Additionally, the company is evaluating the possibility of amplifying the smelting capacity at Hirakud from the proposed 213 000 t/a to 360 000 t/a. An increase in the back-up captive power plant from the proposed 467,5 MW to 967,5 MW is on the anvil.

On the company's greenfield projects, Mr Birla said that Utkal Alumina, a 100 % subsidiary of Hindalco, was setting up a 1,5 Mt/a alumina refinery in Rayagada district of Orissa, India. The project would feed the alumina requirements of the Mahan and the Aditya smelters. These are currently under construction. The production of alumina should commence in Q2 of FY2012. The Utkal Alumina project offers the potential to scale up to 3 Mt/a at relatively low incremental capital cost.

All of the company's greenfield projects – Utkal Alumina, Mahan Aluminium, Aditya Alumina/Aluminium and Jharkhand Aluminium – are on course. These projects are expected to be commissioned between 2012 to 2014. The company has earmarked a capex of around INR 40 000 crore towards these projects.

India

Riedhammer – Contract for Baking Furnace

The scope of supply and works of Riedhammer/DE covers the introduction of the newest automatic firing and control system (heavy oil based) and a substantial increase of output of the existing baking furnace #2 (closed type) at HEG Ltd. This furnace was built and has been in operation since 2001. The modernization is scheduled to be completed in the first quarter of 2011, achieving a final production of about 36 000 t/a of baked electrodes. Set up in 1977, HEG Ltd. (located in Mandideep, near Bhopal/IN) is the largest integrated graphite electrodes plant in South East Asia & Middle East and second largest in the World. The plant has an annual capacity to make 65 000 t of UHP grade elec-

trodes + nipples and exports over 80 % of its production to more than 25 countries.

Austria

RHI AG – 50 Years of Refractory Research in Leoben

In 1960 the Technology Centre was officially presented to the public as a research institute of what was then *Veitscher Magnesitwerke*. The initial team consisted of 42 people. Leoben was chosen because of its central location and close proximity to the plants in Trieben, Veitsch and Breitenau, but also because it is situated close to the University of Leoben and the steel industry. Previously the three plants had operated their own laboratories.

Today RHI AG is the global technology leader with 31 production sites on four continents and has concentrated its worldwide research and development activities in Leoben. More than 150 employees continuously work on the research and further development of existing refractory products and raw materials in state-of-the-art industrial laboratories and test facilities. RHI invests roughly EUR 20 million annually in research and development, an above-average amount in the industry. The federal and provincial governments provide financial support for the numerous research projects.

The successful research activities in cooperation with customers, international research institutions and universities, above all the University of Leoben, have laid the foundation for RHI AG's excellent reputation in the refractories technology. More than 500 patents and 1500 industrial property rights reflect these intensive research activities. The Technology Center Leoben has received multiple awards for the scientific papers of its research staff. The Technology Center also comprises other important departments, among them worldwide purchasing and logistics, quality management, the technical department and production control.

RHI celebrated this anniversary with current and former employees, partners, customers, and guests from politics and business at a ceremonial act on 15 October 2010. In their speeches they particularly emphasised the importance of operations research and development for jobs and the industry location Austria.

Following the ceremony, the guests participated in a guided tour of the Technology Center.

On the same day more than 200 students visited the Technology Center and gained insight in the work areas during a tour of the Technology Center where they learned more about RHI's refractories world. The explanation that hardly any product used in daily life – from water glasses to mobile telephones – can be produced without refractory products caused an aha-experience among the students. On 16 October guided tours of the Technology Center took place all day during an Open House Day.

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Manufacturing & Performance of High-Temperature Materials

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Company Profiles/Interviews

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P-D Group / DE – ArcelorMittal Refractories / PL

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- Clay-rich Rocks and Mining Wastes for the Production of Lightweight Aggregates with Thermal Insulation Properties (Faculty of Biology and Geology / RO)
- Synthesis of Molochite Using Fly Ash from Fused Brown Corundum (WUST / CN)
- The Latest Trends in Refractories Technology for Iron and Steel Production (Nippon Steel Corp. / JP)

Scientific Papers

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- REACH: Effect on the Use of Refractory Fibres (Rath / AT)
- China's Refractories Industry and Future Sustainable Development (Refsource / CN)
- Achieving the Goal of Zero-waste (worldsteel)
- First Achievements of the EU Raw Materials Initiative (Euromines / EU)

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15. – 17.03.2011

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