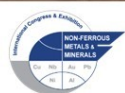


## Post release ICSOBA-NFM 2019 Conference in Krasnoyarsk, Russia

The International Committee for Study of Bauxite, Alumina and Aluminium (ICSOBA; [www.icsoba.org](http://www.icsoba.org)) was founded in 1963 and its mission is to unite industry professionals representing bauxite, alumina and aluminium producing companies, technology suppliers, researchers and consultants from around the world and facilitate the exchange of knowledge, know-how and results of latest research. This is achieved by organizing conferences and rotating the venue and thus enabling both international industry members to visit the areas of interest and local professionals to participate in an international event.

ICSOBA came to Russia for the first time in 2004 when the event was organized in Saint Petersburg. Then, in September 2013 ICSOBA celebrated its 50<sup>th</sup> anniversary in Krasnoyarsk with the Nonferrous Metals of Siberia (NFM) Congress. For its 2019 annual event, ICSOBA has again teamed up with NFM. The 37<sup>th</sup> International Conference and Exhibition was held from 16 to 20 September in Krasnoyarsk, Russia in cooperation with 25<sup>th</sup> “Aluminium of Siberia” Conference within XI International Congress & Exhibition “Non-Ferrous Metals and Minerals”.

The importance of aluminium in the Non-Ferrous Conference & Exhibition was reflected in UC Rusal’s support as host sponsor and co-organizer. Moreover, Viktor Mann, Technical Director at UC RUSAL acted as ICSOBA 2019 President. Other ICSOBA sponsors that contributed to the realization of the event were: Hatch (gold), Nalco Water, Outotec, Solvay (all silver) and GEA (bronze). During the Conference, 50 different companies staged an exhibition of latest technologies, equipment and other devices for the bauxite, alumina and aluminium industry.



General coordination of the event was assured by Dr. Claude Vanvoren, Dr. Frank Feret, Dr. Andrey Panov, Matthieu Arlettaz, Prof. Dr. Peter Polyakov, Olga Popova and Margarita Bergardt.

The joint ICSOBA & NFM event attracted 546 delegates from 177 different enterprises and 34 countries and continents, including Australia & New Zealand, China, Vietnam, India, the Gulf region, Russia, Europe, Africa, the America's and Caribbean.

The speaker program comprised over 160 lectures in three parallel programs for Bauxite, Alumina and Aluminium and in other NFM sessions with topics of general interest (casting, shaping and heat treatment of non-ferrous metals). Very high-quality papers were selected for ICSOBA presentations (107) and published in the volume 48 of TRAVAUX conference proceedings. This year again, the number of TRAVAUX pages exceeds 1000 and Michel Reverdy, Dr. Vinko Potocnik, Matthieu Arlettaz and Dr. Andrey Panov did an outstanding job putting together the conference technical program and TRAVAUX proceedings.

The plenary session, chaired by Prof. Dr. Peter Polyakov (Siberian Federal University), Michel Reverdy (EGA, UAE), Viktor Mann (RUSAL ETC) and Dr. Claude Vanvoren (ICSOBA), comprised presentations by:

Viktor Mann, Technical Director - UC RUSAL, Russia

Bibhu Mishra, Head, Manufacturing Centre of Excellence - Hindalco, India

Abdulla Habib, Chief Operations Officer - Aluminium Bahrain, Bahrain

Alexander Krokhin, Head, Developments of New Alloys - UC RUSAL, Russia

Dr. Yin Zhonglin, Chief Engineer (Alumina) – CHINALCO, China

Joe Woo, Associate Director, R&D - Sunstone Development, China

Dr. Houshang Alamdari, Director - REGAL Aluminium Research Centre, Canada and

Martin Jackson, Analyst, Aluminium costs - CRU Group, United Kingdom



Subsequently there were four separate sessions:

- Bauxite and bauxite resources, Alumina production and Bauxite Residue - organized by Dr. Andrey Panov (UC RUSAL), and Stephane Beaulieu (Aughinish Alumina, Ireland) with 55 presentations

- Aluminium reduction organized by Dr. Vinko Potocnik (independent consultant) and Prof. Peter Polyakov (Siberian University) with 33 presentations
- Carbon and carbon materials - organized by Matthieu Arlettaz (R&D Carbon, Switzerland) with 16 presentations
- Casting – organized by prof., Dr. D.G. Eskin (Brunel University London, UK) and A.Yu. Krokhin, (UC RUSAL) with 29 presentations.

Subjects were approached from a scientific or practical point of view and were presented either in English or Russian while the audience could listen to the simultaneously translated English or Russian version through their earphones. Accompanying slides were projected both in English and Russian language.

More than 120 participants from 20 countries took part in the Bauxite & Alumina Section, including 37 companies from 16 countries presented papers, a total number of published and presented papers in the topics - bauxite, alumina and bauxite residue processing, was 55.

The directions covered wide range of professional topics - from basic studies in physical and chemical fundamentals of technological process, to development of new technologies and equipment, performing industrial tests and their introduction into industrial practice were covered. The latest research and results of practical developments in operation of bauxite mines, reclamation of residue disposal areas and bauxite residue processing were also presented, a separate section on alternative technologies of alumina production and experience in introducing new technologies for obtaining high-value-added products was held. The report by Ann Duncan (Hatch) provided a detailed overview of current research directions for improving alumina production technology (Alumina Technology Roadmap) and a vision for innovations and improvements to be implemented through 2050. Proposals were made to establish a joint technology database and to combine research efforts to correspond to this vision.

During the conference, the following new directions and practices for alumina production were presented: the use of low-cost pneumatic separation technology to enrich bauxite from carbonates, end-to-end optimization of bauxite mine and alumina refinery when switching to a new raw material source, impurities behavior in high-temperature processing of boehmitic bauxites, optimization of thermal flow sheets in evaporation and digestion in alumina production, advanced descaling methods of heat exchanger and tank equipment, advanced methods of mathematical simulation of digestion, thickening, precipitation and calcination, optimization of calcination furnaces and the use of furnaces of new design for production of both smelter grade and non-metallurgical alumina, experience of technology improvement and production of special grades of alumina, new alumina production projects by hydrochloric acid method and assessment of prospects for construction of large scale alumina production by alternative technologies, information on performed studies and large-scale tests of bauxite residue processing in agriculture, to extract alkalis and rare earth elements, production of a number of other products from bauxite residue.

According to domestic and foreign participants - the conference was the strongest in the alumina direction in the world in 2019.

Aluminium Reduction Technology section had 32 full papers and 34 presentations from 14 countries. The papers presented topics on environment, potroom operation, cell modelling, design and control, alumina transport to the potroom and alumina feeding, anode reactions, electrolyte studies, cathode materials, cathode wear and autopsies, wettable cathodes and inert anodes.

In the broad group of environment and resource saving technologies, there were 12 papers. The most notable ones were on perfluorocarbon (PFCs) generation and emissions (four papers) of which the paper on new rules and calculations for PFC emissions by Intergovernmental Panel Climate Change (IPCC) won the best paper award (see the table below). The new calculations for CO<sub>2</sub> equivalent of PFC emissions will include the emissions from high voltage anode effects as until now and also emissions from low voltage anode effects, the so-called background PFC emissions, hitherto unaccounted for. Spent potlining is another environmental threat for which no comprehensive worldwide solution has been put in practice. A paper from China showed that the country which produces 56 % of world aluminium still disposes of most spent potlining (SPL) for land filling in spite of much research for economical and environmentally friendly disposal and recycling. On the other hand, a paper by Emirates Global Aluminum (EGA) reported environmental benefits of using the spent potlining in cement production, where EGA recycles all generated spent potlining now. This paper also won best paper award (see the table below). Carbon monoxide (CO) is a well-known by-product of aluminium electrolysis, but it has been assumed that most of it is burned in the cell. An EGA paper showed that most of the generated CO is emitted to the atmosphere, which normally poses no environment hazard because of its low concentration but causes a problem to EGA because it cannot satisfy too strict UAE environment regulation for CO emissions.

Resource saving technologies were presented by RUSAL, notably a substantial decrease of specific energy consumption in electrolysis as well as the use of unshaped material, lignite semi-coke, for bottom cathode lining, which is cheaper to build than the traditional brickwork and can be in major part recycled. In the same line, a modelling paper from Canada showed that it might be possible to design high amperage cells with energy consumption of 10 kWh/kg Al, which has not been obtained in practice anywhere yet.

In industrial deployment of new high amperage technologies, RUSAL presented the latest results of successful RA-550 Technology in the pilot plant in Sayanogorsk smelter, which was also offered for the industrial visit after the conference. ALBA presented the successful start-up of Potline 6 with 424 cells of EGA DX+ Ultra Technology, now operating at 465 kA.

Carbon Materials section had 11 full papers and 17 presentations from 7 countries. The sessions were on raw materials with 3 presentations, on production of anodes and cathodes with 8 presentations, on quality and performance of anodes and cathodes with 4

presentations and on anodes and cathodes for aluminium reduction technology with 2 presentations.

In the raw material session, a very interesting paper reports on a new technology developed to produce an engineered calcined petroleum coke (CPC) product from coke fines presently only used for energy production through combustion. As CPC prices increase, fines loss cannot be compensated economically by energy production. Pelletizing green petroleum coke (GPC) fines can produce high bulk density pellets referred to as anhydrous carbon pellets (ACP). The paper summarizes key results including pilot anode properties showing improvements in baked anode density, electrical resistivity and other properties when using ACP. Rain Carbon is currently working on building a full scale, commercial plant in the US. In the session on production of anodes and cathodes, a paper from the Greek smelter reported the major reconstruction of central casing of open top baking furnace with a view to increase its lifespan and reduce the total costs comparing to full reconstruction. This paper won the best carbon paper award.

The best papers awards were given to six different authors in the Bauxite & Alumina & Residue session (3 awards), Aluminium and Carbon sessions.

Section	Paper	Company	Speaker
<b>Bauxite</b>	Biodiversity Research Consortium (BRC): A technical and scientific partnership in search of the "State of Art" in Mining Area Recovery	Hydro Paragominas - Mineração Paragominas S.A	<u>Victor Moreira Barbosa</u>
<b>Alumina</b>	Production of Ceramic and Smelter Grade Alumina in Outotec's Dual Purpose CFB Calciner	Outotec, Norway	<u>Linus Perander</u>
<b>Bauxite Residue</b>	Industrial Trials Results of Scandium Oxide Recovery from Red Mud at UC RUSAL Alumina Refineries	RUSAL ETC, Russia	<u>Olga Petrakova</u>
<b>Carbon</b>	Major reconstruction of central casing of open top baking furnace with a view to increase its lifespan and reduce the total cost comparing to full reconstruction	Mytilineos Metallurgy Business Unit (AoG)	<u>Christos Zarganis, Eftychia Liantza, Harilaos Dolgyras, Giannakis Christos, Christophe Molinier and Kosmetatos Dionysios</u>
<b>Reduction</b>	Challenges & latest progress in IPCC methodology for estimating the extent of greenhouse gases co-	Light Metals Research Centre, University of	<u>David Wong, Barry Welch, Pernelle Nunez, Lukas Dion and Alexey Spirin</u>



	evolved in the aluminium reduction cell	Auckland	
	Environmental benefits of using spent potlining in cement production	Emirates Global Aluminium	Chun Man Chow, Srinivasa Pujari, Michael Pan, Tanvi Kulkarni, Mohamed Mahmoud, Heba Akasha, <u>Mohammad Al Jawi</u> and Salman Abdulla

Papers and PowerPoint presentations of this and previous conferences are available to ICSOBA members at no cost. ICSOBA has scanned all historic proceedings, the so-called Travaux volumes. Searchable file could be consulted shortly on the revamped ICSOBA web-site at <http://www.icsoba.org>. There is full list of papers of all volumes, which can be used as a guide for finding specific information or paper.

On 20 September delegates had the option of visiting a full day technical excursion to Rusal's Achinsk refinery where nepheline ore is used as raw material instead of bauxite, or to Rusal's newest Khakas smelter, or participate in a visit to Krasnoyarsk smelter, the largest Söderberg smelter in the world.



The plant management in all three places demonstrated a very good preparation and openness in the course of the visits.



This year ICSOBA subsidized participation of four students in the event: Quiven Inoque Ebicha (Mozambique), John Anawati (Toronto University), Fedorov Aleksey and ElDeeb Amr (both of St. Petersburg Mining University).



In line with ICSOBA's tradition, the conference provided ample opportunity to meet old and new colleagues during excursions, welcome drinks, meals, cruise on the Yenisei River and the Gala Dinner banquet with cultural performances. The ICSOBA & NFM joint event offered an excellent networking potential and was very informative, and many positive feedbacks were obtained from international delegates who took part in it. NFM staff did a great job in organizing all logistics.

The next conference is planned for Jinan, China in October 12-16, 2020 in collaboration with Sunstone Development. As the conference will take place in the heart of Shandong province where most powerful Chinese aluminium and alumina producers are located, there will be excellent representation of production companies, research institutes and equipment manufacturers. Also, the visits to world largest and one of the most modern alumina refineries of Weiqiao (over 8 million tones alumina per year capacity refinery) will be arranged.

China's role in the global aluminium industry justifies a repeat of the successful ICSOBA 2010 and 2014 conferences in China. Further information will be supplied through ICSOBA's website.