

**INTERNATIONAL COMMITTEE FOR STUDY OF  
BAUXITE, ALUMINA AND ALUMINIUM  
ICS O B A  
NEWSLETTER**



A biannual publication

**Volume 13 – June 2015**

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The picture on the front page highlights the invitation to the ICSoba 2015 conference in Dubai.

In case you consider publishing in this forum, please contact the editor before writing your article.

Deadlines for a June issue is 10<sup>th</sup> of June and for a December issue 10<sup>th</sup> of December.

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 Corporations Canada, Ontario under number 802906-7, and  
*Registraire des entreprises*, Quebec under number 1167982181.

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## FOREWORD

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Dear ICSoba Members!

Over the years ICSoba has been travelling the world visiting major bauxite & aluminum production centers. Goa (India), Belem (Brazil), Krasnoyarsk (Russia) and Zhengzhou (China) – they mark recent stops on ICSoba global mission. We all know that most of the aluminum manufacture happens to take place on the Northern hemisphere. The reasons are not just historical but availability of affordable energy gives also a good explanation. In the last two decades the Middle East has demonstrated an extraordinary growth of activity in aluminum smelting thanks, again, to abundant energy resources. In an effort to switch the status quo up a bit, ICSoba takes this year its annual conference south and sets up a stop in Dubai, UAE.

The 33<sup>rd</sup> International Conference and Exhibition of ICSoba will be held at the Rotana Al Murooj hotel **in Dubai from 29 November to 1 December 2015**. For the event ICSoba cooperates with Emirates Global Aluminium (EGA), the jointly-held, equal-ownership company integrating

the businesses of Dubai Aluminium (DUBAL) and Emirates Aluminium (EMAL).

As ICSoba celebrates its 52<sup>nd</sup> anniversary this year, I would like to extend my best wishes to all of you for a joyful and a successful conference to come in Dubai. All pertinent details you will find in the NEWS AND EVENTS and the ICSoba MATTERS. Please do your best to attend.

The 2015 ICSoba conference takes place at the end of November, which is relatively late in the year. The date for the subsequent ICSoba conference is fixed for the beginning of October 2016. There is only 10 months difference between the two events. In order to be able to effectively complete all preparations and allow potential authors to prepare their communications we need to act in advance. Therefore, the 1<sup>st</sup> Circular – Call for Papers announcing the 34<sup>th</sup> ICSoba conference in Quebec City, Canada will be distributed already in September this year. This way all interested parties will have 12 months to prepare for the conference.

It's always nice to hear from long time members. I hope that (besides the annual conference) you are finding your membership to be continually worthwhile! Please let me know if you have any pending questions. I'm always happy to help.

Have a good day!

Dr Frank R. Feret

CEO, Vice President, ICSoba

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## NEWS AND EVENTS

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### 33<sup>rd</sup> ICSoba Conference, ICSoba 2015

#### Organizing Committee

Several individuals form the organizing committee of the conference. General coordination is assured by: Frank Feret (ICSoba), Ali Al Zarouni and Michel Reverdy, both of EGA.

At the 2014 ICSoba conference in Zhengzhou, China several individuals volunteered for organization of the conference program for the Dubai conference. The main program organizers are as follows:

Yin Zhonglin (Chalco), Roberto Seno (Votorantim), Steve Healy (RTA), Vinko Potocnik (EGA), Victor Buzunov (Rusal) and Matthieu Arlettaz (R&D Carbon).

There are also eight session organizers:

Sankar Sankaranarayanan (Hindalco), Denis Audet (RTA), Uwe König (PANalytical), Reinhard Bott (Bokela), Andreas Koschnick (Outotec), Paul Hamil and Wagner Brancaloni (Hatch), and Len Lawrence (Nalco Ecolab).

#### Abstracts and Papers

The organizing Committee is inviting the submission of papers. Enquiries and abstracts can be sent to [icsoba@icsoba.org](mailto:icsoba@icsoba.org). Abstracts should include the title, the text not exceeding 200 words, and the author's name(s), affiliation, position and email address of the corresponding author.

#### Present deadlines for abstracts and final manuscript sending:

<b>Final Abstract:</b>	<b>30 June 2015</b>
<b>Full Paper:</b>	<b>15 September 2015</b>
<b>Presentation and bio data:</b>	<b>15 October 2015</b>

#### Conference Program

The Conference will officially begin on Sunday morning, 29 November with a plenary session. The Exhibition will start at the coffee break on 29 Nov and may close after the afternoon coffee break on 1 Dec.

Hours	28-Nov	29-Nov	30-Nov	01-Dec	02-Dec
7 - 8		Registrations			
8 - 10		Keynote session	Technical Sessions	Technical Sessions	Directors Meeting
10 - 10:30		Coffee	Coffee	Coffee	Coffee
10:30 - 12		Keynote session	Technical Sessions	Technical Sessions	2016 Program organizers meeting
12 - 13		Lunch	Lunch	Lunch	Lunch
13 - 14		Plant trips to Dubai and Abu Dhabi smelters	Technical Sessions	Technical Sessions	
14 - 15	Directors Meeting			Coffee	
15 - 15:30			Coffee	Technical Sessions	
15:30 - 16			Technical Sessions	Member's meeting	
16 - 18	Registrations		ICSoba dinner	Dinner with 2015 organizers & sponsors	
18 - 19					
19 - 20	ICSoba Welcome Drinks	ICSoba dinner			
20 - 21					

### **Keynote speakers**

On Sunday 29 November the main conference will begin with keynote presentations. Among the confirmed speakers who form a very attractive group there are:

The list of confirmed plenary speakers involve at present:

Dr Ali Al Zarouni - Vice-President, Principal Operations, **EGA**

Dr Li Wangxing - Chief Engineer, **CHALCO**

Claude Vanvoren - Vice President of Technology, R&D, **Rio Tinto Limited**

Viktor Mann - Technical Director, **UC RUSAL**

Maurice Laparra - President, **Institute for the History of Aluminium**

Dr Florian Kongoli - CEO, **FLOGEN Technologies Inc.**

Carl Firman - Aluminium Analyst, **Wood Mackenzie Limited**

Sion Roberts – Senior Consultant, **CRU**

Details related to the technical program can be found on ICSOBA website [www.ICSoba.org](http://www.ICSoba.org) and they are updated on the regular basis.

### **Registration and Welcome Reception**

The registration will start on Saturday, 28 November in the evening and will continue on Sunday 29 November in the morning at the Welcome Desk. For registration details please consult:

<http://www.icsoba.org/form/icsoba-2015-delegate-registration-form>

Preregister now for the conference and gala dinner and pay a **reduced early bird rate**.

Welcome Reception with drinks will take place on Saturday 28 November in the evening. In the tradition of ICSOBA lunches and dinners during the Conference are included in the program in order for you to have maximum opportunity to meet other delegates at no additional charge. Lunches will be offered on 29, 30 November and 1 December. Dinners will be offered on 29 and 30 November.

### **Exhibition**

During the Conference there will be an Exhibition of latest technologies, equipment and other devices for the aluminium industry. The exhibition connects equipment, machines, and



materials manufacturers directly with their clients. Companies can give a presentation at the Exhibition. All coffee breaks will take place in the exhibition area.

### **Field trips**

Technical field trips to DUBAL smelter (Dubai) and EMAL Smelter (Abu Dhabi) will take place on November 29, 2015.

### **Accommodation**

ICSoba has blocked 100 rooms at Rotana Al Murooj, the venue of the conference, as well as. The rooms must be reserved before September 15, 2015. Certain number of rooms is also reserved at Towers Rotana and at Rose Rayhaan Rotana at a preferential rate. In these 2 hotels rooms must be reserved before October 15, 2015. Towers Rotana and Rose Rayaah Rotana are located at 30 min walk or 10 min taxi from Al Murooj Rotana. Please make the reservation directly to the respective hotels with copy to [dipa.chaudhuri@icsoba.org](mailto:dipa.chaudhuri@icsoba.org).



### **Sponsorship opportunities**

For details regarding sponsor benefits click on the link below

<http://icsoba.org/sponsors>

For filling up the sponsor form click on the link below

<http://icsoba.org/form/sponsor-registration-form>

### **Corporate member**

For becoming a corporate member click on the link below

<http://icsoba.org/form/corporate>

### **Subsidies to Members**

Members who have insufficient means to pay the cost of participating in an Event may apply for a subsidy. The subsidy might be supplied by a fund that has been established for this purpose (the “Fund”). Generally, Council Members will have priority over ordinary Members.

Subsidies may be granted provided that:

- the Member is able to show that he does not have the means to participate in the Event;
- the Member makes (or has made) a contribution that is considered important for the functioning or continuity of ICSoba (for example, by contributing to the Newsletter and the website, providing legal and public relations assistance, being the driving force behind a special interest group, or being an important liaison for ICSoba with other organisations or companies);
- there are sufficient monies in the Fund; and
- approval of at least 3 directors has been obtained.

The amount of the subsidy will vary in accordance with each Member’s contribution as follows:

- Level 1 Subsidy - waiver registration fee above the cost of meals and conference materials;
- Level 2 Subsidy - waiver of the registration fee;
- Level 3 Subsidy - reimbursement of the whole or part of the cost of reasonably priced accommodation;
- Level 4 Subsidy - reimbursement of the whole or part of the Member’s reasonable travel expenses.

Level 1 subsidy does not draw on the fund. Yet the number of people qualifying for this subsidy should not exceed 5% of the delegates who pay normal fees. Level 2 subsidy would draw an amount on the Fund that is equal to a delegate’s incremental Event cost.

At the end of each Event the Fund could receive a percentage of the Event surplus, which is to be agreed as part of the Annual Account. The annual capital of the Fund is C\$ 4,000. This year one subsidy in the amount of C\$2,000 has already been granted.

**For further details, please contact Dipa Chaudhuri: [info@icsoba.org](mailto:info@icsoba.org).**



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## TECHNICAL PAPERS

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### Movement of Scientists and the Production of Aluminum

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#### INTRODUCTION

Students seeking education and scholars seeking knowledge have been moving from one laboratory to another, from one university to another, and from one country to another since ancient times. Movement of scientists played an important role in the discovery, isolation, and industrialization of a number of metals, e.g., platinum, rare earths, tungsten, and vanadium. The isolation and industrialization of aluminum also involved movement of scientists.

Naturally occurring alum stone used by alchemists to enhance the dyeing of textile fibers, was known to yield a white “earth” when heated at high temperature. This white earth was known as alumina and was an exceptionally stable material that it was considered a chemical element like gold, copper, and tin. When Alessandro Volta in northern Italy discovered in 1800 that an electric current was generated when two metals were separated by an electrolyte, chemists in Europe immediately started to study this new phenomenon and tried to make use of it. Napoleon Bonaparte as First Consul invited Volta to Paris in 1801 to demonstrate to him at the French National Institute (the body that replaced the French Academy during the revolutionary period), the principle of his discovery. Napoleon was impressed by the demonstration. He gave Volta the Gold Medal of the Institute and ordered funds to the École Polytechnique to build a large battery for research.

The news of Volta’s discovery reached England rapidly and a very large battery similar to the one constructed in Paris was built at the newly founded Royal Institution in London. Humphry Davy (1778-1829) (Figure 1) at the Royal Institution succeeded in 1807 to isolate potassium and few days later, sodium using this battery. Once these two reactive metals were available they became the focus of intensive study. Their vigorous reaction with water and their spontaneous burning in air was very impressive. In 1808, Davy announced further his belief that the plentiful compound alumina was the earth (oxide) of an undiscovered metal. Since then, scientists had been making efforts to obtain this new metal.



Figure 1 - Humphry Davy  
(1778-1829)

### **A visitor to Copenhagen**

Davy never made any aluminum himself, but in the early 1820s the Danish scientist Hans Christian Oersted (1777-1851) (Figure 2) succeeded in producing a tiny sample of the metal in the laboratory by reducing the aluminum chloride with potassium amalgam. He had prepared aluminum chloride few years earlier for the first time by heating a mixture of alumina and charcoal in a stream of chlorine. Chlorine at that time was a laboratory curiosity isolated few years earlier by Carl Wilhelm Scheele. Friedrich Wöhler (1800-1882) (Figure 3) on his return trip from Stockholm after finishing his studies there with Jöns Jacob Berzelius, stopped in Copenhagen in 1824 to visit the University. He met Oersted there and learned about his experiments to isolate aluminum. Now in his laboratory in Berlin he repeated successfully Oersted's experiment in 1827. In 1836 he moved to Göttingen to accept a professorship position at the University and in 1845 succeeded in making aluminum in slightly larger amounts from which he was able to show that aluminum was a light metal. Wöhler devoted his work later to organic chemistry and became known for his synthesis of urea from ammonium cyanate, a reaction that defeated the concept of "vital force", that organic compounds could be produced only by living organism.



Figure 2 - The Danish scientist Hans Christian Oersted (1777-1851)

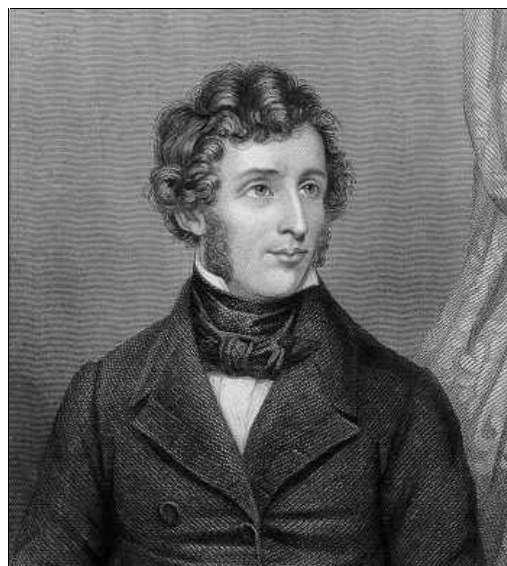


Figure 3 - Friedrich Wöhler (1800-1882), young chemistry student on his way from Stockholm to Berlin, stopped in 1844 in Copenhagen to visit Oersted

### **Aluminum production in France**

French chemists were also active in research to produce aluminum. Henri Sainte-Claire Deville (1818-1881) (Figure 4) professor of chemistry at the École Normale in Paris already produced aluminum in 1854 by electrolyzing molten aluminum chloride-sodium chloride mixture. However, this route was abandoned because, at that time, electric current needed for electrolysis was obtained only from batteries, which were tedious to construct, to operate, and to maintain. He, therefore, considered the chemical method devised by Wöhler and developed the process on a commercial scale. In 1854, he was able to prepare a small bar of the metal to show at the meeting of the French Academy of

Sciences. His friend the great chemist Jean-Baptiste Dumas got an audience with Emperor Napoleon III (Figure 5) and convinced him to subsidize the researches on aluminum. As a result Sainte-Claire Deville was also able to expose the bar at the Paris Exposition in 1855 under the title “The Silver of Clay” which attracted a great attention. He then went ahead to commercialize the process in a small plant at the Glacière District of Paris. However, the process was expensive.



Figure 4 - Henri Sainte-Claire Deville  
(1818-1881)



Figure 5- Emperor Napoleon III  
financed the first aluminum research

### **A visitor from America**

Frank Fanning Jewett (1844-1926) (Figure 6) who had received his undergraduate and graduate education in chemistry and mineralogy at Yale University spent two more years, 1873 to 1875, at the University of Göttingen with Wöhler. There he learned about the promise of the new metal. Jewett returned home to become an assistant at Harvard University. Soon he was nominated to teach at the Imperial University in Tokyo, Japan where from 1876 to 1880 he was one of the small groups of westerners who initiated the teaching of science at the university. In 1880, he became professor of chemistry and mineralogy at Oberlin College in Oberlin, Ohio.

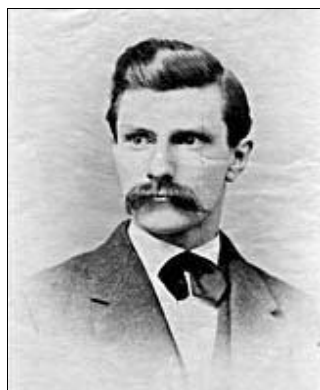


Figure 6 - Frank Fanning Jewett (1844-1926) an American chemist spent two years (1873-1875) with Wöhler in Germany and became mentor to Charles Martin Hall

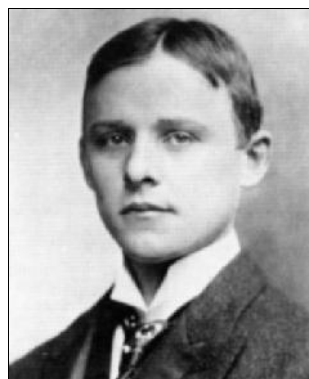


Figure 7 - Charles Martin Hall (1863-1914)

When Charles Martin Hall (1863-1914) (Figure 7) took his chemistry course at Oberlin, he heard Jewett lecture on aluminum, display his sample of the metal, and predict the fortune that awaited the person who could win this metal from its ore. Under Professor Jewett's guidance and encouragement, Hall worked on aluminum chemistry in Jewett's laboratory and at home until he succeeded in 1886 in producing the first ingot of aluminum by electrolyzing alumina dissolved in molten cryolite. Figure 8 shows a potline of early Hall cells in Pittsburgh in 1890. The same process was discovered simultaneously and independently by Paul Louis Heroult (1863-1914) (Figure 9) in France and is the same process used today. Figure 10 shows Pot with six cylindrical anodes corresponding to the first type of pot installed by Héroult at the La Praz Plant in France in 1893.

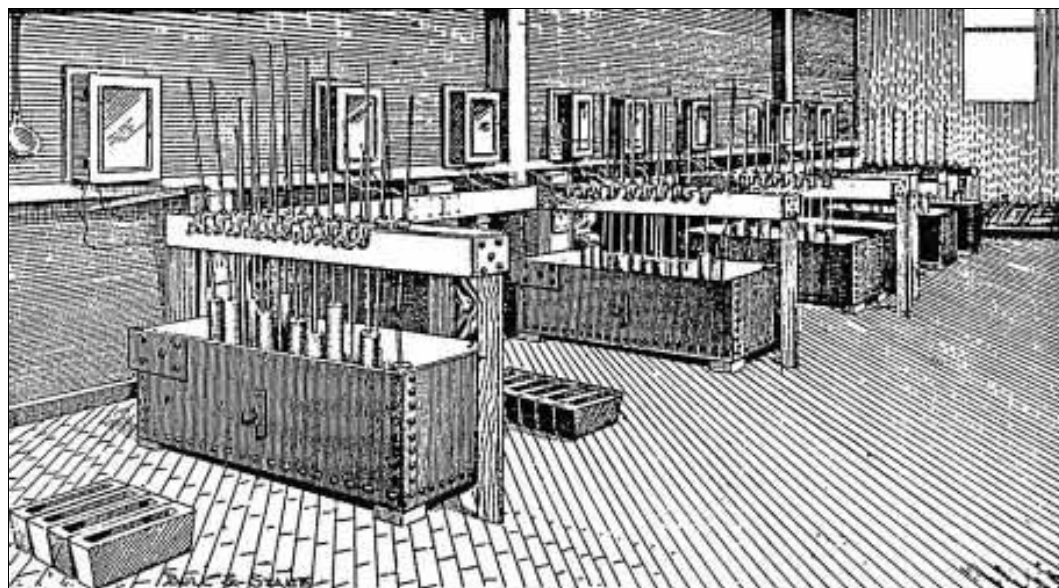


Figure 8 - Potline of early Hall cells in Pittsburgh in 1890





Figure 9 - Paul Louis Heroult  
(1863-1914)

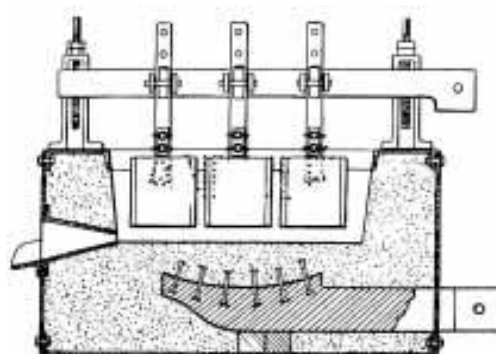


Figure 10 - Pot with six cylindrical anodes  
corresponding to the first type of pot installed by  
Héroult at the La Praz Plant in 1893

### EPILOGUE

Travelling scientists certainly have contributed to advancing knowledge by communicating their observations to others. Famous professors attract students from different countries to study in their institutions and the interaction among these students is of immense importance in the diffusion of knowledge. The invention of a process for the production of aluminum is an example.

### SUGGESTED READINGS

F. Habashi, *Aluminum. History & Metallurgy*, Métallurgie Extractive Québec, Québec City, Canada 2008, 160 pages. Distributed by Laval University Bookstore: [www.zone.ul.ca](http://www.zone.ul.ca)

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## ICSoba MATTERS

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### Manuscript Approval Form

As you all know, ICSoba publishes all submitted papers in the conference proceedings called TRAVAUX volumes. All volumes from the past have been electronically scanned recently and individual papers are available to members as pdf files. ICSoba has been well known for its proceedings and we want to continue producing TRAVAUX after each conference, because the members value such periodical, and because it represents our heritage. Publishing all or a major group of papers in an outside journal is hence not in the ICSoba interest. However, publishing selected papers on a specific profile of activity would certainly be beneficial for ICSoba image and reputation. Earlier this year ICSoba has concluded agreements with two publishing institutions on republishing selected papers from its latest conferences. One of the institutions is China Academic Journals Electronic Publishing House., Ltd (CNKI) and another is journal "Metals", an open source journal in progress. Publishing outside of our own circles requires a clear permission from the authors for reproduction and distribution of the articles. Enclosed in the "ICSoba Matters" please

## Manuscript Approval Form

*Date of Delivery: xx xxx, 2015*

*Author's name: .....*

As the contact author for manuscript, No xx, "*Title of manuscript - please match the title written on this form exactly as it appears on the manuscript*", submitted for publication in Proceedings of the 2015 ICSoba Conference (TRAVAUX), we ask that you review and approve the attached PDF of your manuscript, as it will appear on the CDROM. The manuscript is sent to you for approval of the PDF conversion only and content revisions cannot be accepted at this stage.

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Please sign and date the attached form and return to Dipa Chaudhuri, by email or fax, within 10 days

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Authorized signature of Employer/Commissioning Party Date: .....

of the delivery date. If you find errors on the PDF, please contact Dipa immediately: E-mail: [dipa.chaudhuri@icsoba.org](mailto:dipa.chaudhuri@icsoba.org), Phone: +91 982 328 9817

**Reviewed and approved by:** .....

**Date** .....

## ICSoba Council Members

<b>Name</b>	<b>Affiliation</b>	<b>Country of residence</b>
Matthieu Arlettaz	R&D Carbon	Suisse
Denis Audet	RTA	Australia
Reinhard Bott	BOKELA	Germany
Wagner Brancalioni	Consultant	Brazil
Victor Buzunov	Rusal	Russia
Paul Hamil	Hatch	Australia
Steve Healy	RTA	Australia
Andreas Koschnik	Outotec	Germany
Uwe König	PANalytical	Netherlands
Len Lawrence	Nalco Ecolab	Australia
Vinko Potocnik	Consultant/EGA	Canada/UAE
Michel Reverdy	EGA	United Arab Emirates (UAE)
Sankar Sankaranarayanan	Hindalco	India
Roberto Seno	Votorantim	Brazil
Yin Zhonglin	Chalco	China
Ali Al Zarouni	EGA	United Arab Emirates (UAE)

## Internal organisation

The International Committee for Study of Bauxite, Alumina & Aluminium is an independent association that unites industry professionals representing major bauxite, alumina and aluminium producing companies, technology suppliers, researchers and consultants from around the world.

ICSoba belongs to its members and since the members elect the Board of directors in the Annual Meeting during an ICSoba Event, members determine the policy of ICSoba. ICSoba currently has 238 members.

## Membership

ICSoba provides members with a platform to exchange technical information with each other. Upon their request individual members who are consultants or advisors to the aluminium industry, will be enlisted on the designated Consultants page on the website.

Companies can support ICSoba by becoming Corporate member. Corporate members are shown in every Newsletter and listed on ICSoba's web site. Corporate members can nominate two employees who have the same rights as individual members, such as reduced event delegate registration fee, Newsletters and voting rights. Digital proceedings can be made available to all employees at the company's intranet, and corporate members can sponsor ICSoba events at the reduced sponsor fee.

	INDIVIDUAL MEMBERS	CORPORATE MEMBERS
Reduced Sponsor rates at ICSoba Events		Yes
Reduced delegate registration fee for ICSoba Events	Yes	Yes for 2 nominated employees
Name listed in ICSoba's website	In Consultants page upon request	In Corporate Members page with link to web site
Right to vote on ICSoba matters and eligibility for Presidency and Council	Yes	Yes for 2 employees
Receive a digital copy of a full paper or full proceedings of a past ICSoba Event	Upon request	Upon request
Biannual Newsletter with articles from members, news and statistics	Yes	Yes to 2 employees. Company mentioned in Newsletters
Annual fee (from July to July)	C\$ 100	C\$ 500

You can find an application form for individual membership and corporate membership on ICSoba's website. You can also renew or apply for individual membership together with your registration for an ICSoba event.

## Public relations and Communication

### Memorandum of Understanding between CNIA and ICSoba

#### ***MEMORANDUM OF UNDERSTANDING BETWEEN CHINA NONFERROUS METALS INDUSTRY ASSOCIATION (CNIA) AND INTERNATIONAL COMMITTEE FOR STUDY OF BAUXITE, ALUMINA & ALUMINIUM (ICSoba)***

In the spirit of equality, mutual benefit and friendly co-operation, The China Nonferrous Metals Industry Association (CNIA) and International Committee for Study of Bauxite, Alumina & Aluminium (ICSoba) have identified a framework within the aluminium sector.

The objectives of this framework are to contribute to the industrial knowledge base and to stimulate economic activities along the aluminium value chain.

The Memorandum was signed on 19 February, 2015 in English and Chinese languages and is valid for five (5) years.

### Website

Printed proceedings of past ICSoba events, the so-called Travaux volumes, have been scanned to separate searchable pdf files. There are a few exceptions, these are being searched and scanned as soon as possible. The Tables of Contents of the scanned Travaux volumes have been made public on the website <http://www.icsoba.org/proceedings>. ICSoba members can obtain digital versions up to 20 papers each year at no cost by sending an email request to Dipa [dipa.chaudry@icsoba.org](mailto:dipa.chaudry@icsoba.org). Additional papers are charged for C\$ 20 each.

Your feedback to make the website more attractive is welcome.

### ICSoba's executive office



Not only requests for past proceedings, but all inquiries sent to ICSoba, whether by email to [info@icsoba.org](mailto:info@icsoba.org) or by phone to + 91 982 328 98 17, are addressed by Ms. Sudipta (Dipa) Chaudhuri in Nagpur, India.

Also mailings and the underlying database of ICSoba's contacts are taken care of by Ms Dipa Chaudhuri in the executive office.

### New books published

Below you can find information on recent publications, i.e. De Re Metallica of Prof. Hathi Habashi

## Just published

*De Re Metallica* is a diary of the trips the author has undertaken during his professional career. He visited many industries, universities, research centers, and museums, and participated in many conferences. The book in 5 523 pages and many coloured photos therefore reflects the state of extractive metallurgy since he left his home country Egypt and went to study in Vienna then emigrated to Canada.



**ISBN 978-2-922686-21-0, \$ 1500 + postage**



**Volume 1- Egypt**, published in 2014, 590 pages includes Preface in 75 pages.  
 Part 1: Historical introduction, 201 pages  
 Part 2: Living in Egypt, 219 pages  
**Part 3: Visits to Egypt and the Future of Egypt, 75 pages**



**Volume 2- Canada**, published in 2014, 498 pages, includes a historical introduction in 42 pages



**Volume 3- USA**, published in 2014, 315 pages, includes a historical introduction in 32 pages



**Volume 4- Latin America**, published in 2014, 680 pages, includes a historical introduction in 24 pages



Volume 5 - **Asia**: Part 1- Afghanistan to Indonesia, 600 pages, published 2015.



Volume 5 - **Asia**: Part 2- Iran to Vietnam, 577 pages + indexes, published 2015.



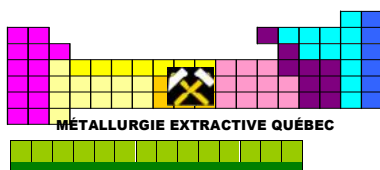
Volume 6 - **Europe**: Part 1- Albania to Germany, 844 pages, published in 2015.



Volume 6 - **Europe**: Part 2- Gibraltar to Vatican, 789 pages + indexes, published in 2015



Volume 7 - **Russia and Other Countries**, published 2015, 630 pages, includes appendices: 1- Interviews, 2- Books by the author, 3- Publications by the author



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**President**

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