

TANTALUM-NIOBIUM
INTERNATIONAL STUDY CENTER

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TIC

2020 ANNUAL REPORT



Presented at the 61st General Assembly of the
Tantalum-Niobium International Study Center (T.I.C.)

Brussels, Belgium, and online, October 12th 2020



NINGXIA ORIENT TANTALUM INDUSTRY CO., LTD. (OTIC)



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- ◆ The biggest Ta & Nb manufacturer in China
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- ◆ The first listed Ta & Nb processing company in China in January 2000
- ◆ The earliest TIC member in China and an Asian member of the TIC Executive Committee
- ◆ Executive member of Ta & Nb Branch of the China Nonferrous Metal Industry Association
- ◆ The Chinese National Ta & Nb Special Metal Material Engineering Technology Research Center
- ◆ Standardization leader of the tantalum and niobium industry in China

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OTIC specializes in producing Ta and Nb key materials for high-tech industry: powders, compounds and customer-specific fabricated parts of tantalum, niobium and their alloys such as wires, ingots, plates, foils, bars, rods, RF superconducting cavity, sputtering target blank, furnace parts and so on for various applications.



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Roskill

Tantalum

*Outlook to 2029,
15th Edition*

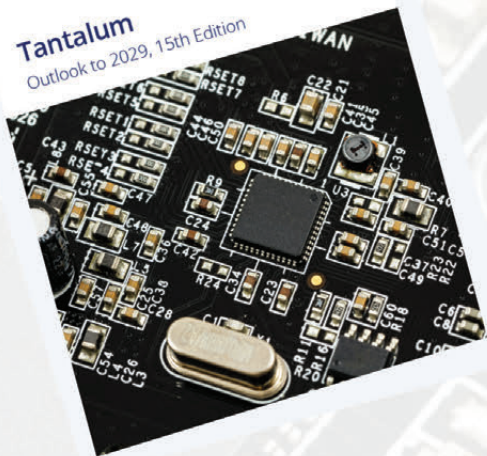
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Roskill's Tantalum: Outlook to 2029 report highlights the major trends in tantalum supply and demand affecting the industry over the coming decade:

- What are the main demand drivers and what changes can we expect to 2029?
- How will forecasts for Australia and Africa change affect the balance of supply?
- Who are the major players at each stage of the supply chain and how does material flow through this complicated industry?
- What is the scenario for tantalum price development?

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Tantalum
Outlook to 2029, 15th Edition



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President's Welcome

Dear Members and Friends,

It's hard to believe that one year has already passed since our meeting in Hong Kong. It is even harder to believe that the concerns we had regarding the Hong Kong meeting, while still real, have been overshadowed by the global pandemic which has upset our lives both personally and professionally. That being said, in many respects the pandemic, in a very good and meaningful way, has helped reprioritize important issues such as family, health and friends, life factors that are too often put on the backburner.

While the "new normal" is anything but normal, it has accelerated innovation and the acceptance of technologies that have been at our fingertips but perhaps not broadly adopted until now. The obvious tools are those that allow us to maintain business continuity while working at a distance. Technologies such as multi-person video-conferencing and active file management come immediately to mind; however, when it comes to the virus itself, we are seeing medical supplies being delivered by drones as well as contact tracing software being used to help minimize the spread of the virus. We also saw sales of laptops and tablets soar in the first nine months of this year as a result of work/learn/teach-at-home initiatives.

However, this is only part of the story. All the data being generated by these tools, as a result of this changing work environment, must flow seamlessly if everything is to function correctly. At the core of all this are the telecommunication systems and a constellation of servers. This step change in data growth, of which distance working is but one unanticipated element, will accelerate the build-out of 5G, including the investment in the server network required to capture, transfer and crunch all this data. With over 50% of tantalum demand dependent on electronics, this can only be a good thing in the near and mid-term with a further increase in demand as economic growth rebounds on a global basis.

Additionally, as we move into a new period of growth, without relinquishing the newly found efficiencies of doing business at a distance, we will see an increase in air travel and therefore an uptick in the demand for high strength niobium alloys as we balance efficiencies with face-to-face gatherings. After all, Zoom and Teams are nice tools, but there is nothing like shaking hands and looking directly into the eyes of business associates and colleagues.

Some of my comments I have stated in previous communications; however, I believe they beared repeating. People are resilient and as a community we will bounce back with a greater foundation of experience and knowledge to put to work for the future.

Wishing you all the best on both a personal and professional basis.

Until we can once again shake hands, please act safely and responsibly.

Dan Persico



About the T.I.C.

Since its founding, the Tantalum-Niobium International Study Center (T.I.C. or Association) has grown and developed to encompass the changing nature of the tantalum and niobium industries and will continue in the same spirit in facing future challenges. Today our membership represents every aspect of the global tantalum and niobium industries.

The Association

- An international, non-profit association founded in 1974 under Belgian law.
- Around 90 members from 30 countries involved with all aspects of the tantalum and niobium industry supply chain (including mining, trading, processing, recycling, metal fabrication, capacitor manufacturing, medical...).
- The Association is run by its Executive Committee, whose officials are elected annually by the members. The Committee reflects the range of members' activities and their geographic spread.
- The Committee is led by the President. Presidents have been drawn from all sectors of the industry and from many parts of the world (see page 10).
- The T.I.C.'s office is led by the Director, who is supported by the Secretary General, the Technical Officer, and external consultants and service providers.

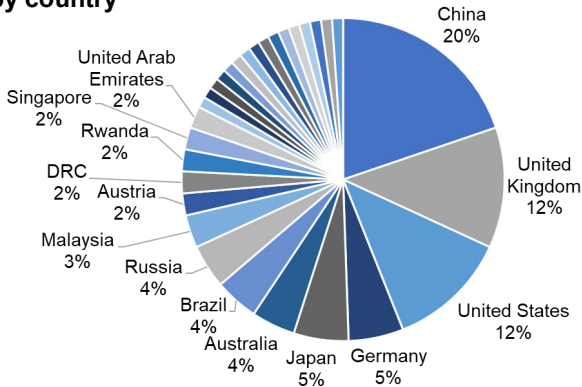
Objectives

- Increase awareness and promote the remarkable properties of tantalum and niobium in all their forms.
- Disseminate information on any matter affecting that industry, excluding price and related information and any other proprietary information.
- Address major issues and challenges facing its industry, including critical raw material and conflict minerals legislation, artisanal and small-scale mining (ASM), and transporting naturally occurring radioactive materials (NORM).
- Organize a General Assembly of the membership in September or October each year for technical presentations and members' annual general meeting. Often the location is chosen to allow a tour of a member company or industrial facility.
- Publish a quarterly newsletter, the Bulletin, covering interesting and informative articles about the T.I.C. and the global tantalum and niobium industries.
- Collect statistics from member companies (via an independent third-party to ensure confidentiality) on tantalum and niobium production, shipments and consumption. Statistics reports are shared with participating members.

Who is the T.I.C.? *

* This snapshot is based on T.I.C. membership in January 2020

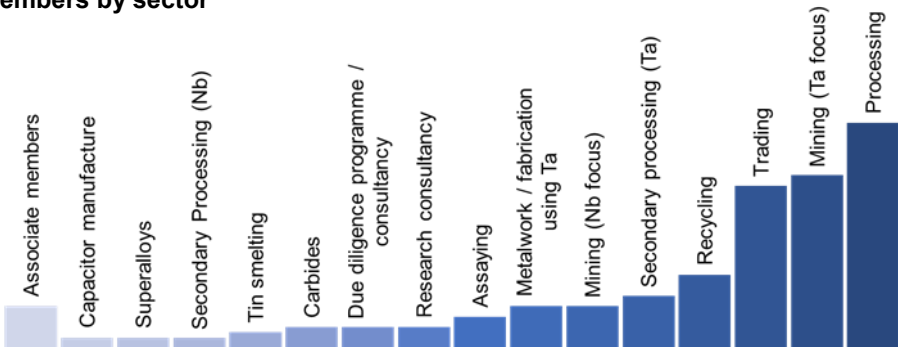
Members by country



Members by location



Members by sector



Executive Committee, Subteams, Officers

Executive Committee

The Executive Committee is drawn from the membership and committee members may be, but need not also be, the delegates of member companies. The Executive Committee named here was elected by the T.I.C. members at the 60th General Assembly, and consists of (in alphabetical order of member's surname):

Fabiano Costa	fcosta@amgmineracao.com.br
John Crawley	jcrawley@rmmc.com.hk
Silvana Fehling	silvana.fehling@taniobis.com
Ronald Gilerman	ronald.gilerman@armerchants.com
David Gussack	david@exotech.com
Jiang Bin	jiangb_nniec@otic.com.cn
Janny Jiang	janny@jiujiangjx.com
Raveentiran Krishnan	raveentiran@msmelt.com
Candida Owens	candida.owens@btinternet.com
Daniel Persico (President)	danielpersico@kemet.com

The 2020 election to the Executive Committee takes place on October 12th during the Association's annual general meeting (AGM) at the 61st General Assembly (held virtually). Those elected stand for one year and there is a maximum of twelve members, according to our Charter of association. Members who wish to make nominations to serve on the Executive Committee must do so at least one month before the annual general meeting.



The Executive Committee at the 2019 AGM in Hong Kong, October 2019

Subteams

Subteams are advisory groups tasked by the Executive Committee with specific projects. In September 2020, the following subteams were operational:

Marketing:

Fabiano Costa (chair)
Roland Chavasse
Raveentiran Krishnan
Emma Wickens

Meetings:

Candida Owens (chair)
Roland Chavasse
David Gussack
Ronald Gilerman
Emma Wickens

Supply Chain:

John Crawley (chair)
Roland Chavasse
Raveentiran Krishnan
Jim Maguire
Candida Owens
William Shannon

Statistics:

David Knudson (chair)
Roland Chavasse
John Crawley
Silvana Fehling
Ronald Gilerman

We are always looking for enthusiastic T.I.C. members to join our range of subteams. If you are interested, please contact Emma Wickens.

Officers of the T.I.C.

While the Association's main office is in Lasne, Belgium, staff also operate from the UK (Director) and the USA (Technical Officer). In September 2020, the officers were:

Director	Roland Chavasse	roland.chavasse@tanb.org
Secretary General	Emma Wickens	emma.wickens@tanb.org
Technical Officer	David Knudson	david.knudson@tanb.org

The T.I.C. also works regularly with several consultants who are specialists in their field (e.g. NORM transport, China, Brazil...) in order to advance the Association's goals.

Disclaimer: Tantalum-Niobium International Study Center (T.I.C.) has made every effort to ensure that the information presented is technically correct. However, T.I.C. does not represent or warrant the accuracy of the information contained in the Annual Report or its suitability for any general or specific use. The reader is advised that the material contained herein is for information purposes only; it should not be used or relied upon for any specific or general application without first obtaining competent advice. The T.I.C., its members, staff and consultants specifically disclaim any and all liability or responsibility of any kind for loss, damage, or injury resulting from the use of the information contained in this publication.

Presidents of the Association

1974	Cornelius Herkströter, Thaisarco
1975	Herman Becker-Fluegel, National Resources Trading / Tanco
1976	Paul Leynen, Zairetain
1977	Reinhard Deil, GfE
1978	Joseph Abeles, Kawecky Berylco Industries
1979	Brian Reynolds, Thaisarco
1980	George Korinek, Hermann C. Starck Inc.
1981	Conrad Brown, Fansteel
1982	John Linden, Greenbushes Tin
1983	Robert Franklin, STC Components
1984	Carroll Killen, Sprague Electric Company
1985	Chikara Hayashi, Vacuum Metallurgical Company
1986	Rod Tolley, Datuk Keramat Smelting
1987	Hans-Jürgen Heinrich, GfE
1988	Harry Stuart, Niobium Products Company
1989	George Korinek, NRC
1990	Peter Adams, Thaisarco
1991	Yoichiro Takekuro, Vacuum Metallurgical Company
1992	Peter Maden, Vishay Sprague
1993	Hubert Hutton, Sogem-Afrimet
1994	Peter Kählert, H.C. Starck GmbH
1995	Robert Barron, Cabot Performance Materials, David Maguire, KEMET
1996	Yeap Soon Sit, S.A. Minerals
1997	William Millman, AVX
1998	John Linden, Sons of Gwalia
1999	Charles Culbertson II, KEMET Electronics
2000	Thomas Odle, Cabot Performance Materials
2001	Axel Hoppe, H.C. Starck GmbH
2002	Josef Gerblinger, Epcos
2003	David Reynolds, KEMET Electronics
2004	William Millman, AVX
2005	William Millman, AVX
2006	Axel Hoppe, H.C. Starck GmbH
2007	William Young, Cabot
2008	José Isildo de Vargas, CBMM
2009	Richard Burt, GraviTa Inc.
2010	Richard Burt, GraviTa Inc.
2011	José Isildo de Vargas, CBMM
2012	Daniel Persico, KEMET Electronics
2013	Daniel Persico, KEMET Electronics
2014	David Henderson, Rittenhouse International Resources
2015	David Henderson, Rittenhouse International Resources
2016	David Henderson, Rittenhouse International Resources
2017	John Crawley, Minerals Resources International AG
2018	John Crawley, Minerals Resources International AG
2019	Daniel Persico, KEMET Electronics

Director's Report 2019-2020

Dear Members and Stakeholders,

The last twelve months have been a challenging time at the T.I.C., as they have been in most industries and indeed across the world in general. While, thankfully, no member has reported the worst impacts of the pandemic, nonetheless the tantalum and niobium industry has not been spared the impact of Covid-19 and difficult decisions have had to be made, more about which, later.

Aside from the pandemic, the situation at the T.I.C. has been quietly successful. Several long-term projects are showing excellent results, our membership is stable, and once again careful planning and cost control has produced a healthier financial situation than had been budgeted.



Roland Chavasse,
T.I.C. Director

Since our 60th General Assembly in Hong Kong in October 2019, this Association has continued to invest in increasing and improving the services it offers. We have firm foundations for the future. In particular, mention must be made of Emma Wickens's tireless work on our postponed Geneva conference, Dan Persico's leadership on NORM and taking the Bulletin to the next level, and Candida Owens and the Marketing Subteam who have helped Emma and I create a virtual conference in just 4 weeks.

Membership

An association is only ever as strong as its members and there are currently eighty four commercial and associate members (see page 24 onwards or www.TaNb.org).

At our 60th General Assembly we welcomed seven new corporate members:

- **ArrowMetals Asia Pte Ltd**, a commodity trader based in Singapore
- **Chepetsky Mechanical Plant ("ChMZ")**, a manufacturer of tantalum powder and rolled metal based in Russia
- **Globe Metals & Mining Ltd**, owner of the Kanyika Niobium Project in Malawi
- **Hunan Huaran Technology Co. Ltd**, a specialist manufacturer of tantalum, copper and silver capacitor cases, based in China
- **Jiangxi Dinghai Tantalum & Niobium Co. Ltd (DHTN)**, a producer of tantalum pentoxide, niobium pentoxide, ferroniobium and K-salt in China
- **RFH Recycling Metals Co. Ltd** a specialist in the processing and sales of refractory metals, based in China
- **SXMINTec ("SMT")** a tantalum and niobium market development and distribution company covering markets in Europe and North America



The Bulletin and Bulletin Reviews

Since February 1975, the Association has published a quarterly journal in English, containing news, information and updates on our industry and the Association's work. Our circulation constantly expands and today it is sent out to over 700 members and stakeholders each quarter.

In 2019, for the first time, we published a Bulletin Review in Chinese and French, in order to improve our reach and relevance to the global tantalum-niobium industry.

This initiative received very positive feedback and this year we decided to expand our range of Bulletin Reviews to include Japanese and Portuguese too. Judging from the feedback we've received these four publications will become a regular feature.

If you would like to receive the Bulletin or any of the Bulletin Reviews please contact the office at info@tanb.org.

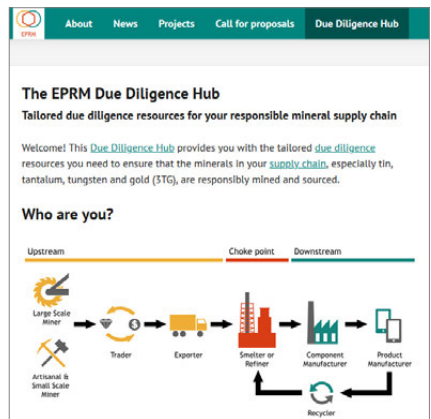
Statistics

The T.I.C. statistics service is one of the many benefits of membership and we are constantly looking for ways to improve it to provide our members with greater insights into the tantalum and niobium markets. The foundation of our statistics service is data submitted by members each quarter. Members' data is held by the independent data collector, Miller Roskell Ltd, a chartered accountant.

Supply Chain

In the European Union (EU) from January 1st 2021 the Conflict Minerals Regulation will come into force, requiring EU importers of tin, tantalum, tungsten and gold from anywhere in the world (not just DRC and neighbouring countries, as with Dodd-Frank) to register their material and demonstrate due diligence.

To help businesses prepare, the T.I.C. is actively engaged with competent authorities and the European Commission on this issue, both directly and through our membership of the European Partnership for Responsible Minerals (EPRM). In particular, we have been active in helping EPRM create a web-based guide to due diligence at www.europeanpartnership-responsibleminerals.eu



EPRM's Due Diligence Hub, designed and developed in part by the T.I.C. Director

In parallel to our work with the EU we are working with the British Government to understand its position on the EU Conflict Minerals Regulation. While it has often been stated that the UK wants to leave in an orderly manner, which would include wholly adopting the EU Conflict Minerals Regulation and many other regulations, at the time of writing there remains considerable uncertainty regarding this matter.

On a related subject, the T.I.C. continued to sit on the Governance Committee of the ITSCI Programme and we are working closely with the International Tin Association (ITA), the other member, to ensure ITSCI is recognised under the EU regulation.

Transport of naturally occurring radioactive materials (NORM)

For many years the T.I.C. has attended meetings of the IAEA's Transport Safety Standards Committee (TRANSSC), at which regulations governing NORM are considered and, if necessary, changed.

This is a critical subject for many T.I.C. members since many ore bodies containing tantalite also contain the radioactive elements thorium (Th) and uranium (U).

For many years T.I.C. has argued that the current exemption rate is set unnecessarily low and at the start of 2020 a major milestone was reached and TRANSSC agreed to set up a new working group to consider what the most appropriate exemption level should be.

The T.I.C. is working closely with KEMET Electronics Corp and TANIJOBIS GmbH on this project and will support the working group's efforts for as long as necessary. Regular updates will be published in the Bulletin.



T.I.C.'s team at the TRANSSC-39 meeting: Ulric Schwela (Salus Minerals Ltd), Christian Cymorek (TANIJOBIS GmbH) and Roland Chavassee (T.I.C.) (photo: U. Schwela)

The impact of Covid-19

Despite everything which this Association has achieved and all the ways it has improved over the last 5 years, no organisation can escape the effects of the Covid-19 pandemic.

In light of the inevitable decision not to hold a face-to-face conference this year (which is our second largest source of income, after the membership fees) it has been decided to take drastic action to conserve funds. As a result, I'm sorry to say that this will be my last letter as Director, the role being cut back as a cost-saving measure.

Since the Director role was created 5 years ago the T.I.C. has changed in many ways,

so let's take this opportunity to look back and reflect on the changes which have taken place.

The role was created when the Executive Committee decided that the T.I.C. would invest a small portion of its significant funds to expand its core competencies and develop additional capabilities, thereby not only improving the value proposition for members, but also the tantalum and niobium industry as a whole.

To satisfy this goal, in January 2016 I was hired as Director, taking staffing levels from 1.5 to 2.4 equivalent full time positions. Since then, some highlights of what has been achieved include:

- Developing a more effective and more respected outward-facing industry body that promotes members' interests at the many forums, working groups and bodies in which T.I.C. participates (OECD, TRANSSC, ITSCI, EPRM, TARANTULA, PPA, TFWG and so forth)
- Greatly increasing our stakeholder engagement, especially with governments and international organisations
- Developing NORM (naturally occurring radioactive material) transport guidance in multiple languages
- Launching an internationally recognised award for tantalum research, the Anders Gustaf Ekeberg Tantalum Prize
- Redeveloping and enlarging the Bulletin newsletter to become the flagship journal of this industry, and introducing annual editions in French, Chinese, Portuguese and Japanese
- Giving more presentations promoting tantalum and niobium at more conferences than ever before
- Updating and expanding our website to include more extensive resources for members
- Holding the first ever General Assembly in central Africa, when we visited Kigali, Rwanda, in 2018

It has been a pleasure serving members as the inaugural T.I.C. Director and I wish the Association well.

I look forward to meeting again in due course, when the pandemic is over and international travel can restart, but until then look after yourself and those dear to you.

Kind regards,

Roland Chavasse, Director

London, UK, September 2020



Talking with Hon. Francis Gatare, CEO of Rwanda Mining Petroleum and Gas Board at the 59th General Assembly in 2018. Taking the T.I.C. conference to central Africa was a highlight of my time as Director of the T.I.C.

TIC TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER
Bulletin N° 180
JANUARY 2020

Has the time arrived for tantalum and niobium in additive manufacturing? (p. 10)




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JULY 2020

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Beautiful metal
Oxide films on tantalum and niobium (p. 10)




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Bulletin N° 176, October 2018

Ytterby: where it all began
(for tantalum, at least, see page 4)



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The minerals of tantalum and niobium (see page 4)



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The Bulletin


Quarterly journal of the T.I.C.

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TIC TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER
Bulletin N° 176, January 2019

Tantalum and niobium global trade statistics (see page 10)




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Bulletin N° 178, July 2019

Charles Hatchett and the origin of columbium* (see page 5)



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ITER: niobium-driven fusion (see page 6)




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made possible by tantalum and niobium (see page 10)



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Will electric vehicle demand impact future tantalum supply? (see page 10)



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MRI: saving lives with niobium (see page 12)



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The Anders Gustaf Ekeberg Tantalum Prize

In 2018 the T.I.C. established an annual science award to recognise excellence in tantalum research and innovation, as part of our aim to increase awareness of the many unique properties of tantalum products and the applications in which they excel*.

It was named the Anders Gustaf Ekeberg Tantalum Prize ('Ekeberg Prize') in honour of the Swedish chemist who discovered tantalum in 1802. The medal, made by the Kazakhstan Mint from pure tantalum metal, is awarded to the lead author of the winning publication at our General Assembly each year.



The shortlist

This year there were seven publications shortlisted for the prize, showing the great versatility of tantalum. Three publications focused on additive manufacturing, while the others covered dark coatings for satellites, shape memory alloys, sol-gel deposition and an improved method for recycling tantalum by solvent extraction. Full details and links to all shortlisted publications can be found at www.tanb.org/view/prize.

The judging procedure

The shortlist is judged by an independent panel of experts who have been selected from around the world to provide an impartial assessment on the technical merit of the shortlisted papers. The T.I.C. acts as secretariat to the Ekeberg Prize but is not involved in the judging process.

In 2020 the T.I.C. was privileged to have on the panel (alphabetical by surname):

- **Richard Burt**, Kielsinn Inc., Canada (Chair)
- **Professor Elizabeth Dickey**, North Carolina State University, United States
- **Magnus Ericsson**, Luleå University of Technology, Sweden
- **Dr Axel Hoppe**, Commerce Resources / consultant, Canada / Germany
- **Dr Nedal Nassar**, U.S. Geological Survey (USGS), United States
- **Professor Toru Okabe**, The University of Tokyo, Japan
- **Tomáš Zedníček** Ph.D., European Passive Components Institute (EPCI), Czech Republic

* Although the T.I.C. represents and supports both tantalum and niobium equally, the Ekeberg Prize will focus only on tantalum, but this is only because CBMM's Charles Hatchett Award (www.charles-hatchett.com) already does an excellent job of recognising niobium published research.

The 2020 winning publication

The 2020 Ekeberg Prize was awarded to a team from Edinburgh University, UK, lead by Prof. Jason Love, for “Tantalum recycling by solvent extraction: chloride is better than fluoride” published in *Metals* (reprinted in Bulletin #183).

Announcing the winner, the independent judging panel led by Richard Burt stated that tantalum recycling will continue to increase in importance, both due to dwindling reserves, and also because recycling is of great societal interest, adding that this work is an important step toward significant improvement in the chemistry of recycling, which deserves more attention.

The authors of the winning paper are Prof. Jason Love, Prof. Carole Morrison, Luke Kinsman, Rosa Crevecoeur and Amrita Singh-Morgan of the EaStCHEM School of Chemistry, University of Edinburgh, and Prof. Bryne Ngwenya of the School of Geosciences at the University of Edinburgh.

The panel wishes to congratulate all entrants whose papers are challenging the boundaries of current knowledge of tantalum, and which may well lead to significant breakthroughs into exciting new applications of the element.

The prize and award ceremony

In a normal year the Ekeberg Prize is awarded at the T.I.C.’s in-person General Assembly, where the winner is the guest of honour, but due to Covid-19 no physical meeting can take place in 2020. However, not to be outdone, on September 11th, Roland Chavasse, T.I.C. Director, visited Edinburgh to award the prize in a suitably socially distanced ceremony. There can be no doubt Anders Ekeberg himself would have found this year’s winning paper particularly interesting since it was the difficulties he had with solvent extraction which caused him to name it ‘tantalum’ in the first place (after the Greek demi-god cursed to endure eternal thirst and hunger).



The winning team (left to right): Prof. Bryne Ngwenya, Luke Kinsman, Prof. Jason Love and Prof. Carole Morrison in a chemistry laboratory at Edinburgh University. Rosa Crevecoeur and Amrita Singh-Morgan couldn't attend. (photo: T.I.C.)

General Assemblies and Symposia


<i>General Assembly Symposium</i>	<i>Month and year</i>	<i>City and country</i>
1st	March 1974	Brussels, Belgium
2nd	September 1974	Brussels, Belgium
3rd	March 1975	Brussels, Belgium
4th	September 1975	Brussels, Belgium
5th	March 1976	Brussels, Belgium
6th	October 1976	Brussels, Belgium
7th	May 1977	Winnipeg, MB, Canada
8th	October 1977	Brussels, Belgium
9th 1st	May 1978	Nürnberg, West Germany
10th	October 1978	Brussels, Belgium
11th	May 1979	Perth, WA, Australia
12th	October 1979	Brussels, Belgium
13th	May 1980	Torquay, United Kingdom
14th	October 1980	Brussels, Belgium
15th	May 1981	Goslar / Bad Harzburg, West Germany
16th	October 1981	Brussels, Belgium
17th	June 1982	Tulsa, OK, United States
18th	October 1982	Brussels, Belgium
19th	May 1983	Penang, Malaysia
20th	November 1983	Brussels, Belgium
21st	June 1984	Stockholm, Sweden
22nd	October 1984	Brussels, Belgium
23rd	June 1985	Boston, MA, United States
24th	October 1985	Brussels, Belgium
25th	May 1986	Kobe, Japan
26th	October 1986	Brussels, Belgium
27th	June 1987	Rio de Janeiro, Brazil
28th	October 1987	Brussels, Belgium
29th 2nd	November 1988	Orlando, FL, United States
30th	October 1989	Frankfurt, Germany
31st	November 1990	Perth, WA, Australia
32nd	October 1991	Philadelphia, PA, United States

33rd	November 1992	Phuket, Thailand
34th	October 1993	Vienna, Austria
35th	October 1994	Aizu-Wakamatsu, Japan
36th 3rd	September 1995	Goslar, Germany
37th	October 1996	Greenville, SC, United States
38th	October 1997	Xian, Shaanxi, China
39th	October 1998	Prague, Czech Republic
40th	October 1999	Perth, WA, Australia
41st 4th	October 2000	San Francisco, CA, United States
42nd	October 2001	Rio de Janeiro, Brazil
43rd	October 2002	Kyoto, Japan
44th	October 2003	Lisbon, Portugal
45th	October 2004	Philadelphia, PA, United States
46th 5th	October 2005	Pattaya, Thailand
47th	October 2006	Innsbruck, Austria
48th	October 2007	Rio de Janeiro, Brazil
49th	October 2008	Shanghai, China
50th	October 2009	Tallinn, Estonia
51st	October 2010	Lake Tahoe, NV, United States
52nd	October 2011	Almaty, Kazakhstan
53rd 6th	October 2012	Cape Town, South Africa
54th	October 2013	York, United Kingdom
55th	October 2014	New York, NY, United States
56th	October 2015	Penang, Malaysia
57th	October 2016	Toulouse, France
58th 7th	October 2017	Vancouver, BC, Canada
59th	October 2018	Kigali, Rwanda
60th	October 2019	Hong Kong SAR, China
61st	October 2020	online



Save the dates

T.I.C.'s 62nd General Assembly
will be held on September 19th
to 22nd 2021 in
Geneva, Switzerland



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Speakers' Biographies

Biographies are of the lead author of presentations and panellists (alphabetical by surname)

Travis Ashburn, KEMET Electronics Corp.

Panellist: Future supply and demand outlook for Ta/Nb post Covid-19



Travis Ashburn, Senior Vice President, Tantalum Business Unit, joined KEMET in November 2000, and has held multiple roles of increasing responsibility in both the Tantalum and Ceramic business group which include Quality Engineer, Area Supervisor, Technical Product Manager, Product Manager, Senior Director - Product Management, Vice President - Ceramic Products and Vice President - Tantalum Product Management and Planning. He is a graduate of the first KEMET Leadership Forum, Class of 2007. He has a Bachelor of Science degree in Chemical Engineering from Clemson University and a Professional Master's degree in Business Administration (PMBA) from the University of South Carolina.

Uli Blankenstein, H.C. Starck Solutions

Innovative Ta/Nb products to power our future by Uli Blankenstein



Uli Blankenstein is Chief Market and Innovation Officer at H.C. Starck Solutions. In this role, he is responsible for the global coordination of market development activities as well as the introduction of innovative products and solutions across metals and industries. Uli has over 25 years' experience in special and precious metals' sales and manufacturing working for globally recognized leaders in this field. He has an MBA from the Otto-Beisheim Graduate School of Management in Germany.

Tiberio Cabianca, Public Health England

"NORM: a fresh look at an old problem" by Tiberio Cabianca



Tiberio Cabianca is the Head of the Planned Exposures Group at the Centre for Radiation, Chemical and Environmental (CRCE) hazards of Public Health England. He has over 25 years' experience in radiological assessment modelling, 5 years as a member of IAEA's Waste Safety Section of the Division of Radiation, Transport and Waste Safety. He is the current chair of the IAEA's Modelling and Data for Radiological Impact Assessments (MODARIA) II programme and a member of the UK delegation at the Transport Safety Standards Committee (TRANSSC). Recently TRANSSC established a new working group to examine the Naturally Occurring Radioactive Material (NORM) exemption level and asked Mr Cabianca to chair it.

Paul Chew, Alfred H. Knight International Ltd

Panellist: Current impact of Covid-19 on the Ta/Nb supply chain



Paul Chew is a Senior Client Liaison Manager for the AHK's Inspection Function. Paul has had a long career spanning 24 years at Alfred H. Knight who are a market-leading independent provider of inspection and testing services for the metals and minerals industry, operating in over 35 countries. Paul has accumulated a wealth of knowledge and experience in the inspection and handling of various metals and minerals, and is currently specialising in Minor Metals which include Ta, Nb, Co and Mo. A long history in supporting and managing client relationships including traders, miners, exporters/importers, resolving global issues has provided Paul with an intimate knowledge of the industry. Responsible for leading a team of 10, who each individually manage key accounts for various metals, Paul ensures high service delivery levels are maintained. Paul played a significant part in the establishment of sampling regimes for various materials and also contributed to AHK's policy on conflict minerals. Paul represents AHK not only at the T.I.C. but also the MMTA and LME, alongside other professional bodies.

Roper Cleland, The ITSCI Programme (ITA)

Panellist: Current impact of Covid-19 on the Ta/Nb supply chain



Roper Cleland is Programme Manager for ITSCI. Previously she has led responsible business initiatives for oil, mining, manufacturing and retail with a focus on addressing human rights challenges and enhancing positive socio-economic outcomes. She has worked for both NGOs and the private sector, and contributed to multi-stakeholder initiatives such as the Voluntary Principles on Security and Human Rights. She holds a Masters of Arts in International Development from the School of Oriental and Asian Studies, and a Bachelors from Vassar College, where she studied anthropology.

John Crawley, Refractory Metals Mining Co. Ltd

Panellist: Current impact of Covid-19 on the Ta/Nb supply chain



John Crawley is the Managing Director of East Rise Corporation Ltd. and also the General Manager of Tantalum Mining Katanga S.A.R.L. (TMK) and Kisengo Mining Company S.A.R.L. (Kisengo Mining) both located in Tanganyika province of the Democratic Republic of the Congo. Prior to working for East Rise, John supervised the technical aspects of construction of a state of the art refinery for processing tantalum and niobium concentrates into high purity K_2TaF_7 . John founded and constructed Niotan, Inc., now called Kemet Blue, one of the premier Western producers of high capacitance tantalum powder. John earned a Bachelor of Science degree, in Chemistry from Occidental College and a Juris Doctor from Loyola Law School, both in Los Angeles, California.

Renzo DeMeo, Prismark Partners LLC

The tech hardware market and the electronics supply chain by Renzo DeMeo



Renzo DeMeo is a senior consultant at Prismark. For over twenty years, he has helped companies in the tech hardware industry capitalize on the economic, technological, and structural changes that affect their business. Renzo provides strategic analysis, "deep dive" market research, and due diligence support across all electronic hardware related end markets and technical domains. This broad perspective helps clients draw linkages across different silos to make confident business decisions. Renzo has a B.S. in Engineering Physics and M.S. in Electrical Engineering.

David Gussack, Exotech, Inc.

Panellist: Future supply and demand outlook for Ta/Nb post Covid-19



David Gussack is the President and Owner of Exotech, Inc. a global leader in recycling exotic metals for the Aerospace, Electronic, Automotive, Power and Medical industries. Starting his career at Exotech working the night shift while in High School, David moved into the sales/purchase department while attending The University of Arizona. After graduating with a degree in Business Management, David spent considerable time living and travelling in Asia and Europe, building Exotech's network throughout those areas of the world. More recently, David has developed his own Senior and Executive teams to help take the day to day operations and provide more time for professional and strategic growth of the company. David sits on the Executive Committee of the T.I.C. and is a respected board member for several charitable organizations locally within South Florida. He is also a member of Vistage, an organization dedicated to company growth and professional development.

Dharam Kotecha, Halcyon Inc.

Panellist: Future supply and demand outlook for Ta/Nb post Covid-19



Dharam moved to Bukavu, DRC in 2014, after leaving a career as an Equity and Commodity Trader at a global investment bank in London to join the third-generation family business. The Kotecha family is deeply rooted in various industries from plastics manufacturing to foodstuff distribution in Eastern DRC, having been established since 1962. Dharam aims to make Halcyon, Inc. a symbol of conflict-free and sustainable mineral trade – from forging sustainable tantalum, tin and tungsten supply chains to educating local miners and traders on the implementation of practical due diligence and traceability measures on the ground. Dharam holds a Masters degree from London Business School and a Bachelor's degree from the University of Warwick in the UK.

Glenn McDonald, AeroDynamic Advisory

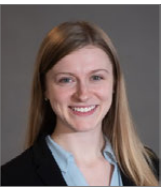
Panellist: Future supply and demand outlook for Ta/Nb post Covid-19



Glenn McDonald is a Principal at AeroDynamic Advisory, a specialty consulting firm focused on the global aerospace and aviation industries. He has ten years of full-time consulting experience, working first at AeroStrategy, then at ICF International. Glenn has supported and managed many different projects, covering corporate strategy development and execution, acquisition search and transaction support, market analysis, cost and performance benchmarking, economic development, and regulatory analysis and development. His primary focus has been in aerospace manufacturing and Maintenance, Repair, and Operation (MRO).

Catherine Tyson, Responsible Minerals Initiative (RMI)

Panellist: Current impact of Covid-19 on the Ta/Nb supply chain



Catherine Tyson is the Program Manager at the Responsible Minerals Initiative (RMI), where she oversees the implementation of RMI's assessment programs, including the Responsible Minerals Assurance Process (RMAP). Previously, she held positions with the Fair Labor Association, JUST Capital and IBM, and her prior experience spans social compliance, project management, process improvement and corporate sustainability. Catherine holds a Master of Arts in International Economics & International Law from the Johns Hopkins School of Advanced International Studies and a Bachelor of Arts from Northwestern University.

Tomáš Zedníček, European Passive Components Institute (EPCI)

Tantalum capacitors: supporting medical ventilators and 5G infrastructure by Tomáš Zedníček



Tomáš Zedníček Ph.D. is President of the European Passive Components Institute (EPCI). Dr Zedníček's doctorate examined tantalum capacitors and was awarded in 2000 from the Technical University of Brno in the Czech Republic. Prior to establishing EPCI in July 2015, he worked for over 21 years at a major tantalum capacitor manufacturer, including 15 years as the worldwide technical marketing manager. He has authored over 70 technical papers and a US/international patent on tantalum and niobium capacitors. He regularly presented at the CARTS passive component conference where he has received four awards for his technical papers, including the 2005 Dr Zandman award for greatest contribution to the passive component industry. Dr Zedníček has contributed several articles for the Bulletin and has sat on the judging panel for the Anders Gustaf Ekeberg Tantalum Prize since 2019. His presentation at the T.I.C.'s 60th General Assembly was voted as the "most entertaining presentation" by delegates.

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Activity: Processing

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Activity: Processing

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Associate

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For information about how you can join the T.I.C. and become a member of the world's largest community focused on tantalum and niobium, see pages 36 and 38.

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Associate

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Activity: Processing

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Activity: Ta Mining

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Activity: Inspection, Sampling, Maritime services and analytical services

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Associate

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Email: fgatare@gov.rw
Website: www.rmb.gov.rw
Activity: Associate Member, Trade association

Associate

Rwanda Mining Association (RMA)

Address: P.O. Box 1856, Kigali, Rwanda
Email: jeanmalic@yahoo.fr, info@rma.org.rw
Website: www.rma.org.rw
Activity: Associate Member, Trade association

Associate

SAMWOOD NEO Inc.

Address: 3F, No.3 Hayakawa Bldg., 2-2, Kandatacho, Chiyoda-ku, Tokyo, Japan

Email: satomi@sw-neo.com

Website: n/a

Activity: Recycling, Trading

Shalina Resources Ltd

Address: 30th Floor, Almas Tower, Jumeirah Lake Towers, P.O. Box 340575, Dubai, United Arab Emirates

Email: uday.shetty@shalina.com

Website: www.shalinareources.com

Activity: Mining

Solikamsk Magnesium Works, JSC

Address: 9 Pravda Street, 618541, Solikamsk, Permskiy Krai, Russia

Email: sales@smw.ru

Website: www.smw.ru

Activity: Processing

Specialty Metals Resources SA *

Address: Rue Tenbosch 42A, 1050 Brussels, Belgium

Email: quentin.lamarche@smr.hk

Website: www.smr.hk

Activity: Trading

Stapleford Trading Ltd **

Address: Wayside, Stapleford Road, Stapleford Abbots, Romford, Essex RM4 1EJ, United Kingdom

Email: jim@staplefordtrading.co.uk

Website: www.staplefordtrading.co.uk

Activity: Trading

SXMINTEC

Address: 5th Floor Tien Chu Commercial Building, 173-174 Gloucester Road, Wanchai, Hong Kong

Email: george.song@sxmintec.com

Website: www.sxmintec.com

Activity: Trading

Taike Technology (Suzhou) Co. Ltd

Address: No. 20 Chengyang Road, Suzhou Xiangcheng Economic Development Area, Suzhou, Jiangsu 215131, China

Email: annali@taike-sz.com

Website: www.taike-sz.com/index-eng/product.asp?classid=125

Activity: Ta Processing

* This membership has applied for transfer at the 2020 AGM to Specialty Metals Resources Ltd

** This membership has applied for transfer at the 2020 AGM to Stapleford Minerals and Metals Ltd

TANIOBIS GmbH

Address: Im Schleeke 78-91, 38642 Goslar, Germany

Email: silvana.fehling@taniobis.com

Website: www.taniobis.com

Activity: Processing

Tantec GmbH

Address: Tantalstraße 1-3, 63571 Gelnhausen, Germany

Email: g.raab@tantec-group.com

Website: www.tantec-group.com

Activity: Design and manufacture of Ta components and equipment

Telex Metals LLC

Address: 105 Phyllis Drive, Croydon, PA 19021, United States

Email: info@telexmetals.com

Website: www.telexmetals.com

Activity: Recycling

Thailand Smelting & Refining Co. Ltd

Address: 80 Moo 8 Sakdidej Road, Tambon Vichit, Amphur Muang, Phuket 83000, Thailand

Email: sales@thaisarco.com

Website: www.thaisarco.com

Activity: Tin Smelting

ThreeArc Mining LLC

Address: Office 5, bld. 159-H, 10A, pr. Narodnogo Opolcheniya, 198216 St. Petersburg, Russia

Email: dbovykin@threearc.ru

Website: www.threearc.ru

Activity: Nb Mining

Traxys

Address: Route d'Arlon 19-21, 8009 Strassen, Luxembourg

Email: frederic.delforge@traxys.com

Website: www.traxys.com

Activity: Trading

Treibacher Industrie AG

Address: Division Hard Metals and Energy Storage, Auer von Welsbachstr. 1, 9330 Treibach-Althofen, Austria

Email: ulf.stromberger@treibacher.com

Website: www.treibacher.com

Activity: Hardmaterial Powders (Carbides, Borides, Nitrides)

TVEL Corporation

Address: 49 Kashirskoe shosse, Moscow, 115409, Russia

Email: root@tvel.ru

Website: www.tvel.ru

Activity: Secondary Processing

Ulba Metallurgical Plant JSC

Address: 102 Abay Avenue, 070005 Ust-Kamenogorsk, Republic of Kazakhstan

Email: marketing_ta@ulba.kz

Website: www.ulba.kz/en

Activity: Processing

United Spectrometer Technologies Pty LTD

Address: 26 Carbernet Street, Saxenburg Park 1, Blackheath, Cape Town, 7580, South Africa

Email: info@ustech.co.za

Website: www.us-tech.co.za

Activity: Supply of equipment for analysis

Vishay

Address: New Industrial Park, P.O. Box 87, Dimona 86100, Israel

Email: Efi.BenBaruch@vishay.com

Website: www.vishay.com

Activity: Capacitor Manufacture

Yanling Jincheng Tantalum & Niobium Co., Ltd

Address: SME Pioneer Park, Yanling, Zhuzhou, Hunan 412500, China

Email: ireneguan@jinchengtn.com

Website: www.jinchengtn.com

Activity: Processing

Yano Metals Co. Ltd

Address: Tokyo office: 1-19-11, Dogenzaka, Shibuya-ku, Tokyo, 150-0043, Japan

Email: m_abe@yanokinzoku.co.jp

Website: www.yanokinzoku.co.jp/en/index.html

Activity: Recycling, Trading

Zhuzhou Cemented Carbide Works Imp. and Exp. Co.

Address: Diamond Road, Zhuzhou, Hunan 412000, China

Email: zccc@chinacarbide.com

Website: www.chinacarbide.com

Activity: Carbides

For information about how you can join the T.I.C. and become a member of the world's largest community focused on tantalum and niobium, see pages 36 and 38.

Antitrust Compliance Policy

This policy was adopted by the T.I.C. at the 57th General Assembly held on October 17th 2016.

Purpose, Scope and Implementation: The T.I.C. is fully committed to ensuring that all of its activities are carried out in full compliance with all applicable antitrust legislation. Failure to comply with this Policy may result in the association and/or its members violating antitrust legislation and being subject to the imposition of substantial fines or even criminal penalties for individuals.

All T.I.C. employees, consultants and their elected representatives are under an obligation to conduct all business dealings in accordance with any applicable antitrust legislation. The T.I.C. employees, consultants and elected representatives must sign a written undertaking to the effect that they have read and understood the Policy and that they agree to adhere to that Policy in the conduct of their business activities.

Members are to ensure that any of their employees involved in T.I.C. activities and all those carrying out activities within the association on behalf of members are fully informed about the T.I.C.'s Policy. Applicant members will be asked to sign a statement to the effect that they have read and understood the T.I.C.'s Policy and that they will adhere to that Policy if admitted.

T.I.C. activities. Information concerning the Policy is available on the T.I.C.'s web site. All meeting agendas will be sent in advance of the meeting, and they will contain a statement to the following effect: "This meeting will be conducted in full compliance with the T.I.C.'s Antitrust Compliance Policy". All chairpersons will be required to remind group members of the contents of the T.I.C.'s Policy on a regular basis. Minutes of the meetings will be distributed to the participants within a reasonable time after the meetings.

Escalation of concerns. All employees, consultants and members and their representatives are required to report any possible breaches of the Policy. Generally, all actual or potential breaches should immediately be reported to T.I.C.'s legal counsel.

The contact information is as follows:

Jones Day, Att. Luc Houben,
4 Rue de la Régence, 1000 Brussels, Belgium
lhouben@jonesday.com
phone: +32 2 645 14 11
<https://www.jonesday.com/brussels/>.

For further information regarding the basic concepts of antitrust law, including cartel agreements, and types of anti-competitive agreements such as price-fixing, market sharing, quantity-fixing and information exchange, please visit the T.I.C. website at <https://www.tanb.org/view/antitrust-compliance-policy>.

Applying for T.I.C. membership

Who can apply?

Any organisation involved in the tantalum and/or niobium industries may apply for membership. The T.I.C. is composed of companies from the entire niobium and tantalum supply chains, from explorers to miners, traders and processors, through to end users and suppliers of goods and services to the industry.

How much are the annual membership fees?

Annual membership fees for the year 2020 are EUR 2750 for corporate members and EUR 500 for associate members, representing excellent value for money. No increase is expected in 2021 (to be confirmed at the AGM on October 12th 2020).

Corporate or associate membership?

Corporate members are commercially involved in the tantalum and/or niobium industries. They are voting members and make up the majority of the membership.

Associate membership is reserved for non-commercial organisations such as governments, civil society groups and academia. The Executive Committee has the final decision concerning which category is applicable to applicant organisations.

How to apply?

Applications for membership are considered at the annual general meeting held each September / October and should be submitted at least one month beforehand.

To apply, an organisation needs to:

- Complete the application form at <https://www.tanb.org/view/join-today> or from info@tanb.org.
- Provide a brief description of its activities in tantalum and/or niobium.
- Confirm that it has read and understood the T.I.C.'s current policies*.
- Corporate applicants need the support of two existing corporate members.
- The Executive Committee considers all applications and those that are accepted as valid are invoiced for three months' membership fee. Full payment is required at least one week before the General Assembly.
- All valid applications for membership are discussed and voted on by the existing members at the annual general meeting via an anonymous vote by ballot paper. Applicants may not be present at the meeting during membership discussions and voting.
- Successful applicants are considered to be a member of the T.I.C. for the year during which they were accepted. Regardless of the voting outcome, applicants are free to attend the technical conference that follows the members' general meeting.

If you are interested in joining the T.I.C. please contact emma.wickens@tanb.org.

* In September 2020, these are the Artisanal and Small-scale Mining Code of Conduct, Transport Policy, Data Protection Policy and Antitrust Compliance Policy. All four are available at www.TaNb.org.



RC INSPECTION
GROUP



RC INSPECTION
INSPECTION SAMPLING

The RC Inspection Group offices are based around the globe and are active in each important, active economic centre and beyond. The Group offers management and team members with more than 30 years' experience and knowhow and therefore its clients benefit from services of the highest quality to be found in the fields of inspection, sampling, weight determination, maritime- and analytical services.

RC Inspection offers worldwide a complete spectrum of services on ores, minerals, concentrates, noble alloys, high purity-, base-, precious and rare earth metals, non-ferrous scrap, ferrous scrap, solid (bio)fuels, agricultural products and fertilizers through a unique network of professionals.

The services are all performed according to ISO/IEC 17020 accreditation (RvA no.: I308) which ensures the clients of accurate and high quality results.

Creating value through combining knowledge and experience.



RCI ANALYTICAL SERVICES
ANALYSIS

RC Inspection keeps the analysis in-house conducted by its group company RCI Analytical Services. The laboratories are to-date strategically located in The Netherlands, Ukraine and Mongolia.

They are equipped with the most modern and advanced instruments to drive accelerated turnaround times and up-to-the-minute reporting through a service driven approach and innovative use of technology.

The analysis are performed using all relevant modern analytical techniques and under full ISO/IEC 17025 accreditation :

RCI Analytical Services The Netherlands – RvA registration nr.: L611 and LME listed

RCI Asia Assayers Mongolia – MASM registration nr.: TL110

RCI Analytical Services Ukraine – NAAU registration nr.: 2T1083

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Benefits of T.I.C. Membership

The T.I.C. undertakes a wide range of activities in support of its members' interests. The benefits of corporate membership include*:

Information services for members

- Monthly updates giving news and information about our industries.
- Quarterly niobium and tantalum statistics reports.
- The Bulletin, our printed newsletter packed with technical papers and news.
- Digital archives of tantalum and niobium technical papers, patents and statistical reports on the members' area of www.TaNb.org.

Technical services

- Priority advice and support from the T.I.C. Technical Officer.
- Guidance on pertinent subjects, such as artisanal and small-scale mining, additive manufacturing, antitrust and transport.
- Liaising with governments and other stakeholder organisations on subjects relevant to our industry including:
 - ◇ Supply chain due diligence and other mineral legislation.
 - ◇ Transport of naturally occurring radioactive materials (NORM).
 - ◇ Critical raw materials.

The General Assembly, our annual technical conference

- Priority booking and exclusive early-bird discounts to attend the world's leading tantalum and niobium conference.
- Exclusive networking opportunities at the annual members' meeting.

Benefit from T.I.C.'s promotion of niobium and tantalum

- Exhibiting and presenting at relevant conferences.
- Commissioning research and reports about critical aspects of the global tantalum and niobium industries.
- T.I.C. is home to the Anders Gustaf Ekeberg Tantalum Prize.

Members decide the T.I.C. policies and strategy

- All members can take part in the T.I.C.'s governance at the AGM.
- Corporate members can nominate representatives to stand for election to the Executive Committee and/or volunteer to serve on a subteam.
- Free listing in the Annual Report and on our comprehensive website.

**Apply today and join the world's largest community
focused on tantalum and niobium!**

* For further information, including benefits of associate membership, please contact the T.I.C. For details of how to apply for membership please see page 36.

TIC

TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

Bulletin Review 2020

To join the Bulletin mailing list contact info@tanb.org

The Bulletin Review

The **NEW** annual publication from the T.I.C.

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Save the dates



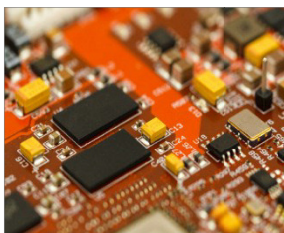
T.I.C.'s 62nd General Assembly

(conference and AGM) will take place in

Geneva

Switzerland, September 19th - 22nd 2021

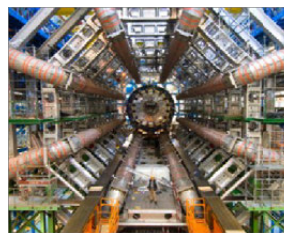
Full details will be published on www.TaNb.org and in the Bulletin quarterly journal in due course.



Capacitors



Superalloys



Superconductors

If you are interested in making a presentation at the T.I.C.'s 62nd General Assembly in September 2021 please contact info@tanb.org by March 31st 2021.



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Electronics

Capacitors; Sputter targets for barrier layers in semiconductors



Medica & Optics

Biocompatible implants, high-voltage capacitors, high reliability ophthalmic and specialty glasses and lenses



Aviation & Energy

Superalloy additives for production of turbine parts



Additive Manufacturing

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Our partner in 3D-printing design, process optimization and in metal digital manufacturing



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