BULLETIN Nº 151
ISSN 1019-2026

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TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

PRESIDENT'S LETTER

Dear friends,

Very soon we shall all meet in Cape Town for our Fifty-third General Assembly, and I am most confident that we shall have another very successful event. We are expecting a high number of participants - around two hundred, including thirty accompanying persons.

Our choice of Cape Town in South Africa, one of the most beautiful cities in the world, reflects the growing interest of the global industry for alternative sources of supply for raw materials. The African continent with its vast number of mining projects, running or under development, has undoubtedly caught the attention of the global industry as a partner of choice for the supply of mining products. Therefore, it was our intention to give an opportunity to all those with such interests related to the tantalum and niobium industry to either speak about their projects in the region or to understand how the developments in the region are progressing. The Cape Town event will be our first ever General Assembly on the African continent.

An excellent and wide ranging programme combining twenty-five technical papers has been arranged, for which we take the opportunity to thank the authors and presenters, and on Wednesday there will be a pleasant and relaxing afternoon including an interesting tour to the wineries that will certainly be appreciated by the participants.

My second term as President comes to an end with this meeting, and I am grateful to my colleagues on the Executive Committee and to the staff of the association for all their support and cooperation.

The constant changes in visa regulations turns the task of helping delegates obtain the necessary documents to travel into a major issue. Our Secretary General Emma Wickens undertakes this, and also the planning for the event and reservations of hotel rooms, in addition to her duties in the administration of the T.I.C. I express the appreciation, on behalf of all the members of the association, for her diligent and round the clock work.

Looking forward to seeing you all in Cape Town.

José Isildo de Vargas
President

CONTENTS

FIFTY-THIRD GENERAL ASSEMBLY & SYMPOSIUM 2012 ON TANTALUM AND NIOBIUM

The Cape Town International Convention Centre

The Fifty-third General Assembly and Symposium 2012 on Tantalum and Niobium will be held in Cape Town, South Africa, from October 7th to 10th 2012. Technical and social events will be held in the Cape Town International Convention Centre (CTICC) while delegates will stay at the Westin Hotel just across the street.

On Sunday October 7th, the registration desk will be open from 10a.m. to 1p.m. and 2p.m. to 5p.m. All participants are invited to a Welcome Reception at the CTICC from 6p.m. to 8p.m.

The formal General Assembly of the association will be held on Monday October 8th at 8.30a.m. and will be followed at 10a.m. by technical presentations until 4.30p.m., with a break for a buffet lunch.

On Monday evening, all participants are invited to take part in a sunset cruise, which will offer stunning views of Cape Town, seen from the water. Transfer by bus to the harbour will take place at 5.30p.m. Drinks

and canapés will be served on the boat and the activity will end by 7.30p.m. to enable guests to make their own plans for the evening.

A second technical session will be held on Tuesday October 9th, breaking for a buffet lunch and ending around 4.30p.m.

On Tuesday evening, all participants are invited to a Gala Dinner to be held in the ballroom of the Convention Centre.

The third part of the extended technical programme will take place on the morning of Wednesday October 10th, ending around 11a.m.

On Wednesday afternoon, all delegates and accompanying persons are invited to take part in a trip to the nearby Constantia wine lands, including a cellar tour, wine tasting and lunch.

Sightseeing tours for accompanying persons are also being arranged for Monday and Tuesday. On the first day, participants will discover the majestic Table Mountain and the famous Kirstenbosch Botanical Garden. The second day will take participants a little further afield, along the spectacular coastline of the Cape Peninsula, through quaint and charming historical villages, to visit the mythical meeting place of the two great oceans.

Kirstenbosch Botanical Garden

TECHNICAL PROGRAMME - ABSTRACTS

The following papers are expected. The announced presenter is the first author listed, unless otherwise specified. The papers are shown in alphabetical order of first author (not in running order).

Niobium sheet for the synthetic diamond industry
Paul Aimone
H.C. Starck, Inc.

Synthetic diamonds are used in many applications including machining, drilling, cutting, optical (laser, IR, RF), acoustics, thermal management, detectors in high energy physics, magnetometry, waste water treatment, and ozone generators. Some of these applications require blocky synthetic diamonds while others use chemical vapor deposition (CVD) processing to deposit diamond films on various materials. In one process, blocky synthetic diamonds are produced by placing a carbonaceous material in a niobium crucible and subjecting it to a combination of high pressure and high temperature (HPHT). The niobium crucibles are produced from large ingots that undergo traditional thermomechanical processing to produce a sheet material that is deep drawn into small crucibles. The quality and surface finish of these crucibles is critical to the final quality of the synthetic diamonds. Consequently, this paper will briefly review niobium's place within the synthetic diamond industry, the challenges and issues of manufacturing the crucibles, and improvements H.C. Starck has made to niobium sheet to meet the deep draw challenges and quality requirements for synthetic diamonds.

The eternal struggle in mining – mineralogy, metallurgy and money
Richard Burt
GraviTa Inc.

Ask a mineral processor, and he will categorically state that the higher the recovery and the higher the grade of the product the higher the income. On the other hand, ask a cost accountant, and the answer will be obvious – cutting your costs will maximize your income.

This provocatively presented paper will review how mineralogy impacts metallurgy, as well as the relationship between recovery and product grade. It will also consider the 'oh so sensible' argument of the cost accountant. Who is right? Either? Both?

The presenter – a lifelong mineral processor, at least at heart – will reach the inevitable conclusion... which will only be revealed in Cape Town...

The tantalum industry – how did it get to here, and where is it going?
Richard Burt and Ulric Schwela (both presenting)
T.I.C.

The tantalum industry might be relatively small, but it is complex, and sometimes, with the many technical advances that are being made, the basic dynamics tend to be forgotten. This paper will provide an overview of the industry, from its beginnings to today. It will trace developments throughout the supply chain, from mine to market, examining the various peaks and troughs in the different sectors, using historical data, including T.I.C. statistics, to show where the market is growing, and where more needs to be done to sustain flagging markets.

The conflict-free supply chain – an update on T.I.C. and other activities
Richard Burt
T.I.C.

The 2008 report by the United Nations Group of Experts was a 'call to action' to the tantalum and tin industries, to 'break the link between mining & trading and the financing of rebels in Central Africa'. The T.I.C. – both as an Association, and also as individual members – has risen to the challenge, working with various international bodies and industry associations, and updates on these activities have been presented at the two previous General Assemblies.

This year, the paper will focus on initiatives in which the T.I.C. is most actively involved; primarily the industry led iTSCi programme, and the 'Public-Private Alliance' a joint initiative of the US Government and Private Industry. These various initiatives have had the result of changing the dynamic within the supply chain, and this will also be discussed. The paper will also provide an update on Government regulatory activities, including the US Dodd-Frank Act and subsequent regulations.

Niobium – production capacity, latest trends and developments at CBMM
José Isildo de Vargas and Marcos Stuart
CBMM

The paper describes the development of production capacity for niobium products at the leading niobium supplier, CBMM, including the plan to increase capacity of niobium oxide production to 10000 tonnes/year in 2012 and of ferroniobium to 150000 tonnes/year by the end of 2014.

CBMM's niobium-rich pyrochlore reserves at Araxá, Minas Gerais, Brazil, have been known for decades as the largest in exploitation around the globe, allowing the company to establish itself as the world's most comprehensive supplier of niobium products. Through its policies and practices CBMM has made niobium one of the most reliable and cost effective materials for steel applications.

The aspects associated with the supply and demand of niobium products and their evolution are discussed in this paper, including recent developments of new applications by segments.

Scrap – a critical part of the tantalum supply chain
David Gussack and Mark Gussack
Exotech

As the combined consciousness of our planet moves towards a more environmentally responsible attitude, industry is finding new ways to conserve resources. Tantalum is a great example, where 20 to 25% of the overall supply comes from recycling, making scrap a critical part of the tantalum supply chain. It is also a stabilizing factor in the volatile tantalum market atmosphere marked by political and humanitarian problems plus the seesaw of mine openings and closings.

Most of the post consumer scrap tantalum is not recoverable. However, the majority of post industrial (pre consumer) scrap is carefully recovered back into the supply chain. The tantalum capacitor industry, as the dominant sector for this metal, has done this successfully for many years.

But what are other industries using tantalum doing to recycle this important metal? Aerospace, machining, electronics, optical, chemical and medical are some of the sectors now recycling tantalum at the industrial level. This paper will focus on some of these non-capacitor sectors and how industry is closing the loop to recover every possible gram of by-product tantalum. We will also examine how industrial scrap from one sector can be viewed as 'virgin equivalent' in another sector, eliminating the need for all scrap to be fully processed back to virgin powder via K-salt.

Finally, we will review how scrap as a stable source of supply has influenced the overall price evolution. Scrap can do this successfully because it represents such a large portion of the tantalum market. An examination of why speculation in scrap is helpful to the entire market will also be presented.

Mineral traceability in the Great Lakes region: an update on iTSCi from the field
Karen Hayes
Pact

Since 2010, Pact has been the implementing partner for the ITRI and T.I.C. Supply Chain Initiative (iTSCi) in the Great Lakes Region. The iTSCi system is a complete system for due diligence, traceability, risk assessment and audit which enables all actors in the supply chain to meet the standards of US legislation on conflict-free mineral sourcing and the OECD Guidelines. The system is now operational in the DRC (Katanga and Maniema) and Rwanda, with studies carried out to determine the feasibility of expansion to other areas (Uganda and Burundi). This presentation will give an update on progress from the field, explaining the mechanisms by which the project is being implemented and the results which have been achieved so far. The results will include the number of sites, miners and companies involved, as well as the tonnages exported. The benefits being generated to government, communities and companies will also be explained. The presentation will present the main challenges that have been encountered and how these have been resolved, as well as identifying the needs going forward. Integration with other initiatives will also be clarified.

Pitfalls and issues associated with proving transport exemption in low-level NORM materials
Paul Hinrichsen
National Nuclear Regulator (NNR)
Presented by Ulric Schwela, T.I.C.

International regulatory bodies have adopted the International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Material (TS-R-1) for the transport of NORM materials. These Regulations define the level below which NORM is regarded as non-radioactive for transport purposes. This should then be the level below which these materials may be traded as non-radioactive, thereby finding a wider and more accepting world market place. When NORM activity levels are relatively low, the question of proving transport exemption becomes critical if the producer wishes to be part of the non-radioactive market. However, materials are very often not subjected to such proof of exemption for a number of reasons which include, but are not limited to the following:
- a lack of understanding on how to apply the exemption criteria
- the cost associated with proving exemption
- reluctance on the part of the regulatory authority to grant exemptions.

This paper examines the pitfalls and issues associated with proving transport exemption of 'low activity' NORM materials. The paper attempts to explain the intricacies in simple understandable language which could be understood by non-regulators.

Pre-polymerized conductive polymer dispersions: capability and product overview
Philip Lessner, Randy Hahn, Jayson Young, Yuri Freeman and Erik Reed
Presented by Daniel Persico
KEMET Electronics Corporation

Since the invention of solid tantalum capacitors utilizing a manganese dioxide cathode system in the 1950s, these devices have been noted for their high volumetric efficiency and reliability. In the late 1990s, the introduction of intrinsically conductive polymer (ICP) as a replacement for the MnO_2 cathode revolutionized the capacitance landscape. The use of conductive polymer offered a new cathode material set – one a thousand times more conductive than MnO_2 – with a more benign failure mode (non-burning). These improvements allowed tantalum polymer capacitors to gain popularity rapidly throughout the design community as engineers quickly took advantage of this new technology in various applications. These devices exhibited excellent reliability at low working voltages (less than or equal to 10 volts); however, reliability suffered at higher working voltages and no products were offered for applications exceeding 19 volts. In 2004, KEMET discovered that tantalum capacitors utilizing pre-polymerized conductive polymer dispersions as the cathode eliminated the previous voltage restrictions associated with conductive polymer cathodes. The dielectric breakdown voltage of capacitors manufactured with the pre-polymerized conductive polymer dispersions are limited primarily by the anode and dielectric quality, not the cathode system, enabling tantalum capacitors with voltage ratings up to, and potentially exceeding, 100 volts to be developed. Numerous products utilizing this new capability have been commercialized for both consumer and specialty applications. This paper provides an overview of this exciting new cathode technology and the new products coming to market as a result.

Low de-rating reliable and efficient Ta/MnO_2 capacitors
Philip Lessner and Yuri Freeman
Presented by Daniel Persico
KEMET Electronics Corporation

Special applications of solid tantalum capacitors with manganese dioxide cathode require 50% de-rating at temperatures equal or below 85°C and additional de-rating at temperatures above 85°C. Manufacturers of these capacitors also require 50% de-rating for both commercial and special capacitors. As a result of the de-rating, volumetric efficiency of solid tantalum capacitors, their major selling point, is reduced by a factor 4 to12. This results in proportional increase in the capacitor volume and weight, which is critical for many applications. It is believed that de-rating increases reliability of all types of capacitors. With regard to solid tantalum capacitors, there are factors that negatively affect reliability due to the de-rating, especially, in high voltage capacitors. When these factors dominate, actual reliability can deteriorate as a result of the de-rating. The paper describes positive and negative effects of the de-rating on reliability as well as technological ways of making highly reliable solid tantalum capacitors with low (no) de-rating.

Processing technology research into large size niobium coating of target material
Li Zhaobo, Zhang Guojun, Ren Xiao, Wang Kai, Zhang Chunheng and Li Guipeng
Presented by Jiang Bin / Guo Hong
Ningxia Orient Tantalum Industry Co. Ltd

This paper introduces three parts of the processing technology research into large size niobium coating for sputtering target material. From the setting and controlling of the shape and thickness tolerance in the rolling process of finished products, the control of the surface levelling process of semi-finished and finished products, through to the control of the surface treatment of the finished product, these are all several key areas of research and control technology. Seven months of discussions and experiments have produced specifications of: L=(792.8±0.20) ×B=(692.5±0.20) × δ =(6.3± 0.20) mm for large size niobium coating for sputtering target material. Regarding the technical indicators of: grain size ≤ 100 µm, surface roughness ≤ 1.6 μ m, plan degree ≤ 0.8 mm, the production of large size niobium coating for sputtering target material completely meets these technical indexes. The company was able to solve the problem of producing large size niobium coating for sputtering target materials using existing equipment.

Responsible mineral supply chains from conflict-affected and high risk areas – the 'closed pipe' model
William Millman
AVX Limited

Mining and trading of the 3Ts (tantalum, tin and tungsten) in the Kivu and Maniema regions of the DRC (conflict affected areas) largely follow the 'comptoir' model. Their absence from mining sites where large numbers of 'creuseurs', using artisanal methods, operate, leads to open pipelines with many intermediaries. This increases the challenges to develop the necessary due diligence practices.

In the Katanga province, the authorities steered away from this model and moved to one of professional exploration, semi-mechanised artisanal production on a large scale with integrated buying, storage, transport and export operations. This allows the formation of closed pipelines, which greatly simplifies traceability and the creation of secure chains of custody. Such a closed pipeline was developed within the 'Solutions for Hope' pilot for responsible sourcing. This paper provides an overview of its operation and seeks to answer the three key questions – security, sustainability and scalability.

Mitigating the risk of 'conflict' tantalum
Gregory Mthembu-Salter
Phuzumoya Consulting

The tantalum industry has become increasingly impacted by emergent international regulation concerning conflict minerals and traceability. Among the legislation impacting the industry is the US Dodd-Frank Act, and the Democratic Republic of Congo (DRC) Government's 'arrêté' requiring mining companies trading in 'conflict minerals' to exercise due diligence. Member states of the International Conference on the Great Lakes Region (ICGLR) are also preparing a certificate to be issued to mining companies whose production is deemed 'conflict free'. There are in addition due diligence guidelines from the UN Group of Experts on the DRC and the Organisation for Economic Cooperation and Development (OECD).

This paper examines why these regulations have emerged, looks at latest developments in the emergence of this regulatory environment, and the consumer demand that underpins it, and examines ways in which companies are seeking to implement the rules. The paper also considers how the regulatory environment is working out in practice in the DRC, and the responses of the various stakeholders, including mining companies, state officials and the Congolese armed forces. The paper concludes by assessing likely future developments, both in the DRC and internationally concerning due diligence, and looks at ways in which players in the tantalum industry might best place themselves in this context.

The Advanced Metals Initiative of South Africa
Johann Nel
South African Nuclear Energy Corporation (Necsa)

The Advanced Metals Initiative (AMI) was created by the Department of Science and Technology (DST) of the South African government about six years ago. The mandate of the AMI is to coordinate research and develop processes in South Africa for beneficiation of raw minerals across the whole value chain up to final products. The metals that are focused on by the AMI include Ta, Nb, Zr, Hf, Ti, Al, precious metals, as well as ferrous and base metals. The AMI consists of four networks, namely the New Metals Development Network (NMDN), the Light Metals Development Network (LMDN), the Precious Metals Development Network (PMDN) and the Ferrous Metals Development Network (FMDN). The NMDN is coordinated by the South African Nuclear Energy Corporation Ltd. (Necsa) developing processes related to Zr, Hf, Ta and Nb. The LMDN is the responsibility of the Council for Scientific and Industrial Research (CSIR) involved with processes for Ti and Al manufacturing, while Mintek is coordinating precious and ferrous metals research. Several South African universities are also involved in the AMI at post-graduate research level. Although South Africa does not have significant resources of tantalum or niobium, deposits exist in several of our neighbouring countries. The processing of tantalum- and niobium-bearing minerals usually involves the use of fluorinating agents. In the context of the AMI, Necsa is carrying out research on the fluorination and purification of tantalite. Zirconium-niobium alloys are also used as cladding material for nuclear fuel, linking niobium research with the nuclear industry.

Addressing denials/delays of shipment of radioactive materials in Africa
Mamdouh Yassin Osman
Sudan Atomic Energy Commission (SAEC)

The denial and delay of Class 7 shipments has been recognized as an international problem by the IAEA as well as by some other international organizations, e.g. IMO, ICAO. In 2006, the International Steering Committee (ISC) was created by the Director General of the IAEA so as to plan and implement the required policy and actions in order to solve this problem globally.

The ISC has made a good deal of effort towards overcoming the problem of denial and delay of radioactive shipment throughout the world. The action areas adopted by the ISC are awareness, training, harmonization, communication, economics and lobbying. To enhance the communication between the ISC and African member states, the IAEA called the African countries to identify a person to serve as point of contact at the national level with the IAEA in regard to this problem. Moreover, one person has been identified by the IAEA to serve as a regional coordinator. A clear function and responsibilities have been developed by the ISC for National Focal Points (NPSs) as well as for the regional coordinator. By February 28th, the total number of NFPs identified was only 15 out of 41 African member

states. In the same context, the IAEA has also organized some workshops in Africa to raise awareness of the problem and try to unify the efforts towards finding solutions. Despite all these efforts, which lasted about seven years, the problem of denial of shipment is still far from being resolved in the region. The main reason for this is the lack of sufficient commitment from the NFPs towards the implementation of integrated plans to solve this problem. Another reason is the lack of awareness of the scale and impact of the difficulty experienced by radiation users in Africa. For that the ISC has recently approved a new approach in which the problem of denial has been added to a new technical cooperation project in the region. This approach is expected to bring more commitment at national and regional levels towards solving the problem.

In this paper details of the efforts made so far, as well as the new approach to solving the problem of denial and delays in Africa, are described. In addition, a proposed action plan in this respect is outlined.

SEC final rule on Dodd-Frank Conflict Minerals Section 1502
Daniel Persico
KEMET Electronics Corporation

The Dodd–Frank Wall Street Reform and Consumer Protection Act (Pub.L. 111-203, H.R. 4173) was signed into U.S. federal law on July 21, 2010. Title XV of the Dodd-Frank Wall Street Reform and Consumer Protection Act contains several specialized disclosure provisions. For example: Section 1502 proposed to require persons to disclose annually whether any conflict minerals (tantalum, tin, tungsten and gold) that are necessary to the functionality or production of a product of the person, as defined in the provision, originated in the Democratic Republic of the Congo or an adjoining country and, if so, to provide a report describing, among other matters, the measures taken to exercise due diligence on the source and chain of custody of those minerals, which must include an independent private sector audit of the report that is certified by the person filing the report.

Certain aspects of this rulemaking will require consultation with other federal agencies, including the State Department, the Government Accountability Office, and the Commerce Department.

On December 15, 2010, the U.S. Securities and Exchange Commission (SEC) proposed rules necessary to implement Section 1502, and on August 22, 2012 issued the final rule for this implementation. This presentation reviews among other things the final rule in relation to the original proposal, the criteria for determining who is required to report (issuers), and the requirements and timing for reporting.

Conflict-free and socially sustainable: a comprehensive vertically integrated tantalum supply chain
Daniel Persico
KEMET Electronics Corporation

For the stakeholders in the global tantalum supply chain, the reality of the situation is that all involved can and should play a part in proactively developing a socially and economically sustainable business model for the industry. Ongoing discussions about the cost of compliance and many of the other complexities related to the EICC/GeSi Conflict Free Smelter (CFS) Program or provision 1502 of the Dodd-Frank Wall Street Financial Reform Act are but excuses to turn a blind eye toward legitimate efforts focused on resolving the issues that have fostered the conflict minerals problem in the Democratic Republic of Congo (DRC) and central Africa as a whole. To move forward on solving the issues, there are a number of actions that must be taken by various stakeholders; however, as a start, direct investment, at multiple levels, is an essential first step. Investment that focuses on the economics of the extended tantalum supply chain addresses one aspect of achieving sustainable stability. A comprehensive plan that also includes investment in social sustainability is as important in that it addresses the central issue of secure and sustainable advances in the quality of life for the artisanal miners, their families and their communities. Kemet's efforts towards this end will be discussed as they relate to recent actions in the development of a comprehensive vertically integrated tantalum supply chain.

Next generation of high voltage, low ESR tantalum conductive polymer capacitors
J. Petržílek, T. Zedníček, M. Uher, I. Horáček, S. Zedníček, M. Bárta
Presented by William Millman
AVX

Tantalum capacitors designed for high voltage applications (above 25V) have been used for many years in telecommunication, industrial, automotive or other high reliability applications. The conventional high voltage tantalum capacitor design is using a manganese dioxide cathode that provides good reliability, stability and robustness. Nevertheless there are certain limitations. First of all there is the operating voltage – even with optimized processes of dielectric formation, rated voltages of such parts are mostly limited to 50 or 63V. The other limitation is ESR. Very low ESR values have been achieved by using special anode shape designs such as multianodes or fluted anodes, but further ESR decrease is limited by low conductivity of MnO_2. Also a thermal runaway failure mode of the conventional MnO_2 tantalum capacitors is a concern for some surge current intensive circuits. Thus higher voltage de-rating of 50% minimum is recommended in surge current intensive circuits that further limit the maximum operating voltage of conventional tantalum capacitors.

Conductive polymer cathode material has been proved to provide a solution that addresses ESR reduction and reduces ignition failure mode. Nevertheless, until recently, working voltage of tantalum conductive polymer capacitors was limited to approximately 20V due to the maximum achievable breakdown voltage of such capacitors. The latest development on polymer materials has successfully addressed the issues with low BDV and high DCL. The new polymer technology can offer not only low ESR and reduced ignition failure mode benefits, but also higher

working voltages compared to the conventional MnO_2 technologies. 35V and 50V polymer capacitors have been introduced to the market in 2010, followed by 63 and 75V ranges in 2011 with prospects for 100 and 125V capacitors. Due to the nature of polymer capacitors' surge robustness and reduced ignition failure mode, lower de-rating of 20% can be used. This significantly widens the working range of tantalum capacitors to the new applications, such as telecommunications, LED TVs, Notebook power supplies, industrial applications, using higher rail voltages.

This article presents potential possibilities and a roadmap for the next generation tantalum polymer capacitors in expanding its capability towards the high voltage, ultra low ESR capacitors and thus opens a way for new designs with improved power capability within a smaller package, higher output and safer designs.

The Maboumine project

Xavier Revest and Antoine Greco
Eramet

Eramet, a leading global producer of manganese, nickel, high-performance special steels and alloys, decided to consider a diversification strategy into niobium through the development of the Mabounié deposit.

This carbonatite-based ore body located in the Gabonese interior was first discovered by the French geological survey BRGM in the 1980s. It is a world-class polymetallic open-pit deposit containing niobium, tantalum, uranium, rare earths and phosphates.

Eramet is actively working on the development of a specific process aiming at recovering from the ore all the metals contained in the deposit. A pilot plant will be built-up on site in Gabon in 2015, allowing the production of the first commercial lots. The development of the project would include the construction of logistic infrastructures allowing the transport of materials between Lambaréné city and the Atlantic Ocean.

The set-up of mining and metallurgical operations is also being planned according to sustainable development principles and to the best practices for the respect of the environment. The Maboumine project is supported by the Gabonese government, the project being part of the 'Emerging Gabon' long-term development strategy for the country.

Statistics: the why, the how and the what

Ulric Schwela
T.I.C.

The T.I.C. organises the collection, collation and communication of niobium and tantalum industry statistics for its member companies. To better understand the 'what' that results, we need to understand the 'how' of the statistics collection and the 'why' it is done in the first place. So why do we collect statistics? To observe the past trends in production and consumption of niobium and tantalum, with the intention of inferring what the immediate future might hold. While the T.I.C. does the obtaining and observing, it is not permitted to make any comments on the future and so it is left to the readers to use the statistics as they see fit.

How then are statistics collected? Of the 86 member companies, a number of companies solely provide services to the industry or are otherwise not in a position to provide data relevant to the industry statistics. Most member companies do however contribute to one or more categories of the niobium and/or tantalum statistics. To provide assurance that collection is confidential, companies submit their individual company data to an independent third party collector. This collector then collates the data and provides the T.I.C. with a summary report which is distributed to the members. It is important to note that non-member companies do not report statistics to the T.I.C.

What are then the results of the statistics collection? Data for the period 2003-2012 will be presented, showing various trends and explaining some of the peaks and troughs that have occurred over the years.

Transport problems and solutions

Ulric Schwela
T.I.C.

Ten years ago, the T.I.C. took its first steps in tackling the difficulty of transport of tantalum raw materials, which are Naturally Occurring Radioactive Materials (NORM). Back in 2002 there was anecdotal information from a few members about new regulations which were classifying tantalum raw materials as radioactive and which made it difficult to obtain transport. At the prompting of A&M Minerals and Metals, a T.I.C. delegation of four people from A&M, Alfred H. Knight (AHK) and H.C. Starck (HCST) attended a small meeting in Paris organised by the International Atomic Energy Agency (IAEA). It was the T.I.C.'s first exposure to how the IAEA functions and a great deal of useful information was exchanged. In July 2003 another T.I.C. delegation from AHK and HCST plus the Secretary General attended a major transport conference held at the IAEA headquarters in Vienna. In October of the same year, at the T.I.C. General Assembly in Lisbon, the President Dr Gerblinger called for a 'Working Group on Transport of Tantalum-bearing Materials with Naturally Occurring Low-level Radioactivity'; this was later shortened to the 'Transport Committee'! The T.I.C. had taken the first step down a long and winding path which was to see preliminary data collected from members, a major study into the risk posed by transport of tantalum raw materials, close co-operation with the IAEA in determining the appropriate regulatory level for transport of NORM, being a founding member of the International Steering Committee on Denial of Shipment (ISC) and later being Chair of the ISC, as well as developing a number of information papers and tools which could assist members in their task of arranging transport of their NORM tantalum raw materials. The above review will lead to 2012 and the current status of the transport regulations, the IAEA

Coordinated Research Project on NORM, the work of the ISC and other stakeholder bodies of industry and regulators. The presentation will conclude with a time line for the work anticipated for 2013 onwards.

A historical analysis of T.I.C. membership
Ulric Schwela
T.I.C.

The T.I.C. currently has 86 member companies, ranging from exploration companies through established miners, traders and processors to end producers of niobium and/or tantalum components, as well as a number of companies providing services or products to the industry. This diverse membership base has varied with time, from first being a group of tantalum miners, later including tantalum processors, then adding the niobium industry and various types of companies along the way. While some types of companies are more prevalent than others, no one group dominates the membership. Instead, there is a balance which allows the T.I.C. to receive the opinions of a broad interest base and thus represent the entire supply chain, from head to toe. Geographically, the membership was intentionally international from the outset and has always spanned the globe, although purely in terms of membership numbers the centre of gravity has gradually shifted towards the Far East.

Tantalum polymer capacitors that support leading-edge consumer equipment
Yasushi Takeda
Presented by Tak Ohashi
Sanyo Electric Co., Ltd

Evolution of information technology (IT) is very rapid and infrastructure surrounding IT, such as broadband and mobile technology, also changes significantly. Thanks to the IT evolution, people can access the internet 'whenever, wherever and whatever'. SaaS (Software as a Service), smart phone, notepad, ultrabook and social media such as Twitter are starting to be utilized on the business scene.

In addition, reinforcement of IT infrastructure by private cloud and the utilization of social infrastructure such as smart city are expected. In the future, IT is expected to play an even more important role than it does currently.

The quantity of IT data processed by the infrastructure tends to increase year by year. The more data quantity increases, the higher the frequency and the faster the speed required to process the data. Also long duration batteries with high mobility, small form factor and low profile consumer products are required.

As the requirements of the products develop, the area of printed circuit board that can be allocated to electronic components becomes smaller, and height restrictions mean that low profile components must be used.

Thus, the electronic components are required to be small with a low profile. In this paper, the current situation and the future of tantalum polymer capacitors that support leading-edge consumer equipment are described.

Source Intelligence™ – managing transparency in the supply chain
Matt Thorn
Source 44

Matt Thorn will provide a detailed look into the challenges manufacturers face mapping their supply chains beyond Tier-1 suppliers. With the ever-increasing demand for supply chain transparency, manufacturers must delve deeper and deeper into their supply chains, a complex task laden with unique obstacles depending on where a supplier is positioned within that chain. Thorn will explore opportunities for suppliers throughout the supply chain to address efficiently these demands and the potential business benefits associated with transparency. Thorn's company, Source 44, combines technology with the power of direct human interaction to engage suppliers, collect and centrally manage supply chain data that can be used internally as a management decision support tool or selectively shared externally with customers and suppliers to meet transparency requirements.

Source 44 develops a powerful and scalable supply chain intelligence and supplier performance management platform that supports corporate sustainability, compliance and social responsibility initiatives. Source Intelligence™ is an integrated data management platform that allows companies efficiently to collect, analyze, disclose and share real-time supply chain information to meet the increasing demand for transparency in their supply chains.

Understanding tin slag: an important source of tantalum and niobium
Ricardo Torrente, Egberto Silva and Bernard Muniz
White Solder Group

A mine is never 100% composed of compounds of a single metal because of the complex formation of the earth's outer layer (crosta terrestre) at the beginning of time. Tin associated with tantalum and niobium minerals has been found in numerous mine occurrences (for example, most of the Brazilian mines currently in operation) and what was once regarded as a contamination has become an important source of metals to the industry.

The complexity of the tin smelting process and the low grade of the Ta_2O_5 and Nb_2O_5 content in the slag are still a challenge to the industry in order to overcome the transport and processing costs to form a valuable end product for clients. Enhancing this concentration could bring to the market a large quantity of metal locked in low grade tin slag.

Our paper will try to explain how these slags are generated, why the tantalum/niobium grades are decreasing and what trends in the process could bring about an increase in the tantalum and niobium concentration in the tin slags once again.

MEMBER COMPANY NEWS

We would like to remind you that articles concerning T.I.C. members or the industry in general are posted regularly on the T.I.C. website in the section entitled 'News'.

CHANGES IN MEMBER CONTACT DETAILS

Advanced Material Japan Corporation

Following the promotion of Mr Hiroaki Yoshinaga to the position of director of the Sales Division, Advanced Material Japan Corporation has nominated a new delegate to the T.I.C. Mr Daisuke Kawamata can be contacted on dkawamata@amjc.co.jp.

Conghua Tantalum & Niobium Smeltery

Conghua Tantalum & Niobium Smeltery can be reached on the following email address: ctns723@163.com. This replaces the address ctns@21cn.com which is no longer current.

Globe Metals & Mining Ltd

As Mr Mark Sumich has left the company, Mr Les Middleditch has become the new delegate to the T.I.C. for the company Globe Metals & Mining Ltd. His email address is: les.middleditch@globemetalsandmining.com.au.

Kuala Ketil Metal Sdn Bhd

The company Kuala Ketil Metal Sdn Bhd has nominated a new delegate to the T.I.C., Mr Hong Shii Shin. He replaces Mr Hong Buan Seng. The contact email address remains: buanseng@gmail.com.

Metalink International Co., Ltd.

The company has advised a new address: Metalink Building, No. 8 East Jinxin Road, Jiangjun Avenue, Jiangning Economic Development Area, Nanjing 211153, China.

Tel.: +86 (0)25 84799888
Fax: +86 (0)25 84798787 or 84798989

Molycorp Silmet

The delegate to the T.I.C. for Molycorp Silmet, Mr David O'Brock, has changed email address. His new address is david.obrock@molycorp.com.