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T.I.C.

TANTALUM-NIOBIUM INTERNATIONAL STUDY CENTER

PRESIDENT'S LETTER

The world economy is still giving us reason for concern. The situation continues to be uncertain, although many experts are talking about the first signs of recovery. In terms of the electronics sector, the economic tailspin of the semiconductor market seems to have bottomed out, and there are now indications of a slight increase in orders. We are also seeing an end to the decline in prices.

As far as tantalum is concerned, inventory corrections in the whole supply chain are almost over. The general expectation is that the market will begin to recover during the second half of 2002. At the time of writing, the final T.I.C. statistics for 2001 are not yet available, but there is evidence that tantalum processed products shipments in 2001 dropped to the level of 1998, after the record year in 2000. This should give us reason for hope.

The tantalum expansion project of Sons of Gwalia at the world's largest tantalum mine in Greenbushes, Australia, is, of course, very good news, and we wish them all the best of success. Ensuring long-term supplies of tantalum raw materials will help abate market instability. And needless to say, we all can benefit when there is a reliable and steady supply of tantalum.

I am told that preparations for the Forty-third T.I.C. General Assembly in Kyoto from October 6th to 8th are well under way. Nichicon has kindly offered to host this year's event with a plant tour, and I can assure you that the programme will be both interesting and informative for all participants. Let us hope that the signs of recovery we are seeing now will have become reality by the time we meet in Japan!

Axel Hoppe
President

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OCTOBER 2002: KYOTO

Japan holds an important place in the electronics industry, so it is highly appropriate for the T.I.C. to organise its Forty-third General Assembly meeting in Kyoto from October 6th to 8th 2002.

The technical sessions, General Assembly and social events will take place at the Kyoto Hotel, where rooms have been reserved for participants. Presentations of papers will highlight the tantalum industry in Japan, but will range over the rest of the world and cover niobium also.

Opening with registration and a welcome reception on Sunday October 6th, the meeting will continue with the General Assembly of the members of the association on Monday, plus a day-long technical programme on Monday. Japanese members of the T.I.C. will generously host the gala dinner on Monday evening.

Nichicon Tantalum will very kindly offer a plant tour of its capacitor factory on Tuesday to complete the meeting.

The ancient historic and cultural sites of Kyoto and Nara will offer a wealth of opportunity for the sightseeing tours arranged for those accompanying the delegates, and even for further touring before and after the formal programme.

All those who wish to take part must pre-register with the T.I.C. by September 6th. Invitations will be sent to the nominated delegates of member companies at least three months before the meeting. Others interested in attending should contact the T.I.C. without delay: T.I.C., 40 rue Washington, 1050 Brussels, Belgium; telephone: +32 2 649 51 58; fax: +32 2 649 64 47; e-mail: info@tanb.org.

http@

www.tanb.org
e-mail to info@tanb.org

ALTERNATIVE MATERIALS FOR ELECTROLYTIC CAPACITORS

by Dr Karlheinz Reichert, H.C. Starck & Co GmbH KG. *This paper was presented in the technical session of the meeting in Rio de Janeiro, October 2001.*

A solid electrolytic capacitor consists of a porous sintered pellet of tantalum metal (the anode) with an embedded tantalum wire and an amorphous, dielectric layer of Ta_2O_5 which is anodically formed on the surface of the pellet. The anodized porous body is then impregnated with a cathode material (e.g. MnO_2, conductive polymers), connected to a cathode lead wire and encapsulated in epoxy resin. The figure below shows the general design of a tantalum chip type capacitor.

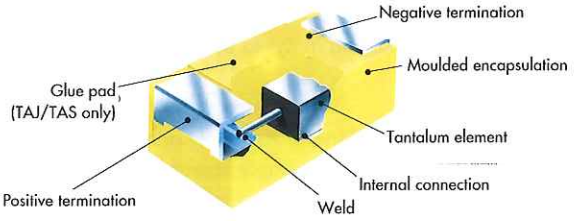

Figure 1: Design of a chip type capacitor

Many times in the last forty years it has been the goal of various researchers to find a substitute for tantalum in electrolytic capacitors. The logical substitute for tantalum has always been niobium because of the similarity of its chemical properties and some of the physical properties. In addition, amorphous niobium pentoxide has a significantly higher dielectric constant (ε~42) compared with Ta_2O_5 (ε~27), although this is partially negated by a higher oxide growth rate per volt (Nb_2O_5~2.9nm/V, Ta_2O_5~1.9nm/V).

Niobium capacitor production for military applications was started in the late fifties in the former Soviet Union because of the shortage of tantalum. However, the lack of a sophisticated process gave niobium powders with non-ideal morphology, poor purity, and low specific surface areas. This prevented a broader use of niobium as capacitor material in the world market. A niobium powder suitable for production of solid electrolytic capacitors must fulfill very complex requirements:

- high chemical purity (>99.9%), especially with respect to "harmful" elements such as C, Fe, Cr, Ni, Al, Na, K
- a high specific surface area for storage of high capacitance
- open pore structure which allows good impregnation with counter electrode precursor
- a narrow particle size distribution and a good flowability which allows use in fully automatic high speed presses
- strong agglomerates resulting in high crush strength of anode pellets
- a high sinter activity for a good bonding of the particles to the wire

Using magnesiothermic reduction, the main problem is the strong exothermic nature of the reaction which is hard to control. Once a mixture of the niobium oxide and the reduction metal has been ignited, the reaction proceeds very fast and reaches high temperatures (>1000°C) in a few seconds. The reduction is difficult to control because of the increasingly high pressures and temperature. This also places extreme requirements on the reactor material, for example, good heat removal is essential. In particular, the batch to batch reproducibility, with respect to particle size distribution of the powder, for instance, is poor. For this reason none of these processes mentioned above will yield in high purity niobium powder combined with a high specific surface area suitable for capacitor applications.

In contrast, the heat management of the reduction of Nb_2O_5 with magnesium vapor is much easier to control. This is one of the key steps of a new process recently developed at H.C. Starck which permits the production of very pure niobium powders (purity with respect to metallic impurities >99.9%) with high specific surface areas combined with a unique, sponge like morphology (see SEM pictures below).

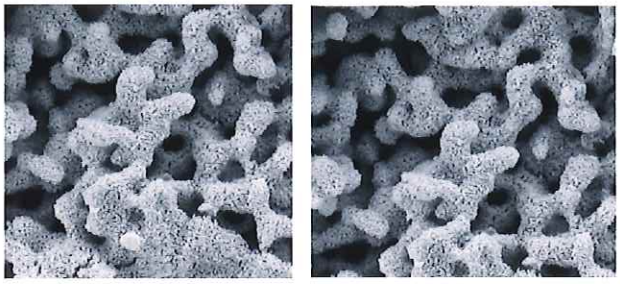

Figure 2: SEM pictures of very pure niobium powders

As shown in the flow chart in Figure 3, the reduction of Nb_2O_5 to niobium metal can be carried out in one, two (via NbO_2) or three steps (via NbO_2 and NbO), depending on the desired powder properties (purity, physical properties etc.).

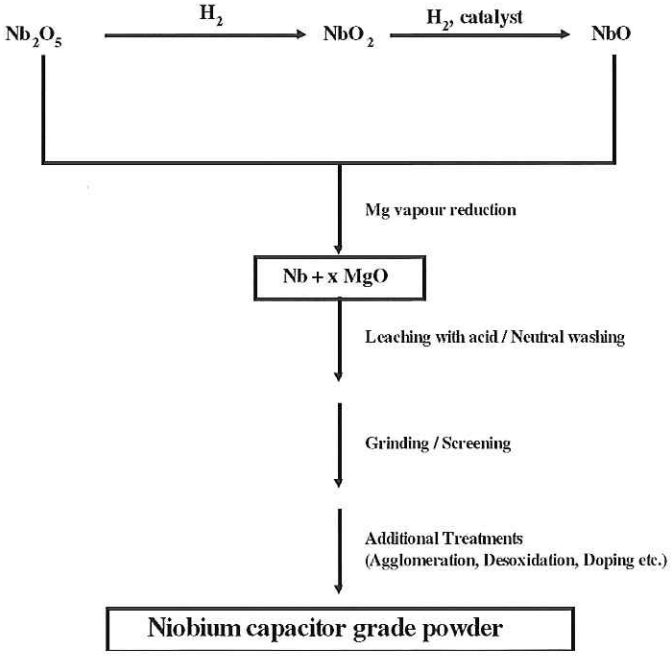

Figure 3: Flow chart for the production of niobium capacitor grade powder

This process will produce a niobium powder with a wide range of specific surface areas which correlates to the specific capacitance of the powder. The physical characteristics of these new niobium powders are quite comparable to capacitor grade tantalum powder (flowability, bulk density etc.). For this reason they can be processed with nearly the same equipment

and processes used for the production of tantalum capacitors. Typical properties of new niobium powders are given in the table below:

Table 1: Typical Properties of Niobium Powders via Magnesium Vapor Reduction

Oxygen/Surface Area [ppm/m2]	[ppm/m²]	≤ 4000
Metallic impurities	[ppm]	≤ 1000
FSSS	[µm]	3 - 8
Bulk Density (Scott)	[g/inch³]	12 - 18
Flowability (Hall)	[sec/25g]	≤ 28 without vibration
Surface Area (BET)	[m²/g]	0.5 - 10
Particle size (Mastersizer) D50	[µm]	≤ 210
Particle size (Mastersizer) D90	[µm]	≤ 320
Specific Capacitance CV/g	[µFV/g]	40.000 - 170.000
Leakage Current Ir/CV	[nA/µFV]	< 0.5
Wire Pull Strength (72 mg Anode)	[kg]	≥ 2.0
Crush Strength (72 mg Anode)	[kg]	

These powders have been recently evaluated by many capacitor manufacturer and the feasibility of making good solid electrolyte niobium capacitors with very high capacitance and low leakage currents has been demonstrated. These niobium chip capacitors will have better volumetric efficiency than aluminum electrolytic capacitors. An application for surface mounted niobium capacitors would be as a substitute for those wishing to replace OS-CON-type aluminum capacitors with a more reliable and smaller capacitor.

Two major improvements of the new niobium powders were recently achieved at H.C. Starck laboratories. First, anodic niobium oxide films were doped with vanadium, demonstrating improved properties of the dielectric layer in comparison to oxide films on pure niobium. In particular, it has been found, with the aid of impedance spectroscopy and evaluation of Schottky-Mott diagrams, that the concentration of oxygen vacancies in anodically produced oxide layers on vanadium doped niobium is significantly reduced and similarly low as in corresponding Ta_2O_5 layers. For this reason, anodized pellets of vanadium doped niobium show, as in the case of tantalum, no BIAS dependence of capacitance.

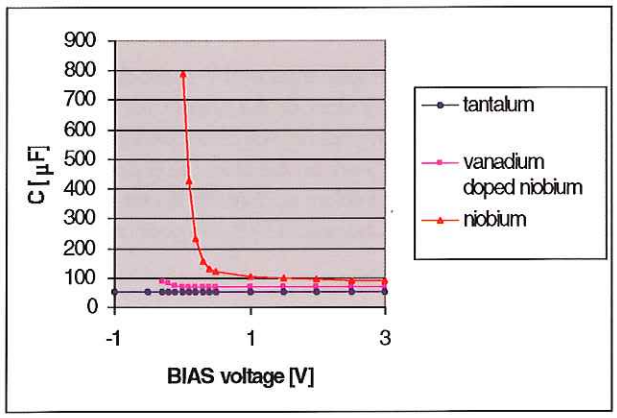

Figure 4: BIAS dependence of capacitance of Nb, Ta and V-doped Nb anodes

The second observation was that alloying of the new niobium powders with tantalum results in a dramatic increase in capacitance. For example, a Nb-25Ta alloy powder, produced by co-reduction of Nb_2O_5/Ta_2O_5 mixtures with gaseous magnesium, shows a specific capacitance twice as high as that of pure niobium powder with a comparable surface area. It was found that the growth rate of 2.4nm/V of the dielectric oxide layer of these alloys lies between those of Ta_2O_5 and Nb_2O_5. In addition, there is evidence that the dielectric constant of the mixed oxide Nb_2O_5/Ta_2O_5 (ε approx. 65) is even higher than that of pure Nb_2O_5.

DLA

We thank the DLA for this news of US Stockpile sales.

A table of the Annual Materials Plan 2002 was printed in T.I.C. Bulletin 108.

The Defense National Stockpile Center continues the sales of its tantalum and columbium products for Fiscal Year 2002. The Annual Materials Plan, approved by the U.S. Congress, determines the quantity of material that DNSC is allowed to sell each fiscal year.

On December 17th 2001, the Defense National Stockpile Center announced the award of approximately 24 050 pounds of columbium carbide powder (21 371 pounds contained columbium) to ABS Alloys and Metals, Mexborough, England, for an estimated current market value of $86,000. The sale exhausted the Stockpile's inventory of columbium carbide.

On February 21st 2002, the Defense National Stockpile Center announced the award of approximately 20 000 pounds of columbium metal under Solicitation of Offers, DLA-COLUMBIUM METAL-001. Offers were received on February 8th 2002. The award was made to Cabot Performance Materials, Boyertown, PA, for an approximate value of $311 000. This sale exhausted the fiscal 2002 Annual Materials Plan quantity, and sales are suspended for the remainder of the fiscal year.

On December 19th 2001, the Defense National Stockpile Center announced the award of approximately 20 600 pounds of tantalum metal vacuum grade (ingots) under Solicitation for Offers, DLA-TANTALUM METAL VACUUM GRADE-001. Offers were received on November 30th 2001. Awards were made to Cabot Performance Materials, Boyertown, PA; Charter Trading Ltd., Chicago, IL; and H.C. Starck, Newton, MA, for an approximate value of $1.9 million.

There is an offering for 19 421 pounds of Tantalum Metal Ingots scheduled for March 12th 2002 at 1.00p.m.

To date, no other offerings for the Tantalum group materials have been planned.

For more information about Tantalum and Columbium sales in Fiscal Year 2002, please contact the Directorate of Contract Sales, Defense National Stockpile Center at 8725 John J. Kingman Road, Fort Belvoir, VA 22060-6223. The telephone number is +001 7030 767 6500 and the web site is https://www.dnsc.dla.mil/.

(Note: On January 9th 2002 the Stockpile announced that it had made no awards for 20 000 pounds of columbium metal offered on December 14th 2001.)

EXPLORATION NEWS

There has recently been a surge in exploration for tantalum minerals. T.I.C. members have been at work, and the reports by Angus and Ross, Haddington, Tantalum Australia, and on developments at Sons of Gwalia are included in the news of member companies also in this issue of the Bulletin. However, there have also been numerous reports by companies which are not, or not yet, members of this association, and this is a summary of information picked up in the press and on the web. It is not exhaustive, there are undoubtedly more companies also involved in such projects.

Tertiary Minerals plc reported in August 2001 its first metallurgical results on samples from the Rosendal tantalum deposit on Kemiö Island, on the south-west coast of Finland, and described results as 'highly promising'. This tantalum-bearing pegmatite has been estimated by the Geological Survey of Finland, which discovered it, to contain 1.3 million tonnes with an average grade of 289g/tonne Ta_2O_5. Recoveries provided by a low-cost gravity concentration method were similar to those obtained in existing commercial operating plants.

In January 2002 Tertiary said that an independent technical and scoping study had evaluated a 150 000tpy open pit mining operation with an 11 year life, producing annually 66 000lb of tantalum pentoxide, and also feldspar. Its favourable situation of the deposit near the coast, the politically stability of Finland, and the proximity to European markets are advantages.

Tertiary Minerals, in February 2002, announced that it had been awarded a five-year exclusive licence to explore the Ghurayyah (pronounce it Goor-eye-ah, advises Tertiary) deposit in the north west of Saudi Arabia. This was estimated at '385 million tonnes grading 245g/tonne Ta_2O_5, 2840g/tonne Nb_2O_5 and 8915g/tonne of zirconium oxide', equivalent to 208 million lb Ta_2O_5. Access was described as excellent, which is an advantage, and a work programme has been proposed for three years.

Another large deposit, this time in Egypt, is being investigated by Gippsland Ltd, a mining company based in Perth, Western Australia. The Abu Dabbab tantalite project is located some 770km south of Cairo on the western shore of the Red Sea. In the 1970s, this deposit was explored by EGSMA and the Geological Research Institute Giredmet, of Moscow. Higher demand for the available minerals, which include feldspar as well as ores of tantalum, niobium and tin, together with advances in gravity separation technologies, have brought renewed interest in it. With an initial mine life of 15 years, the company plans to treat 1 million tonnes per year, to produce 430 000lb Ta_2O_5 and 200 000lb Nb_2O_5 annually. Advantages of the project were ready access, no environmental or archaeological complications, free access to unlimited water, and exemption from a number of taxes including profits taxation under an Egyptian law to encourage foreign investment.

Another Australian company has also looked to Africa for new projects. In the last quarter of 2001, Rusina Mining Ltd acquired a 100% interest in Crater Mining (Pty) Ltd and with it three exclusive prospecting licences in Namibia, two of which mainly concern tantalum. The licences for Nainais and Okombahe cover a total area of 1980 square kilometres of the Nainais-Kohero Tin-Tantalum Pegmatite Belt. Between 1936 and 1986 the Tin Tan Mine at Nainais produced tin and tantalum concentrates, its tantalite was analysed at 24.4% Ta_2O_5, says Rusina Mining.

Numerous exploration projects are being undertaken in Canada. Commerce Resources Corporation has been making regular reports on its drilling programme at its Verity and Fir properties near Blue River, British Columbia, 'both of which have potential for large tonnages of tantalum and niobium', says the company. In February 2002 Commerce Resources declared itself 'greatly encouraged' by the results of a scoping study on samples taken from the Verity and Fir Carbonatites. The Fir Carbonatite, where investigation is less advanced, is understood to contain ferrocolumbite and pyrochlore in a ratio of 20:1. Infrastructure is described as 'exceptional', with good road access to the region, and a railway nearby with a railsiding a short distance away.

Avalon Ventures is a Canadian mining exploration and development company with a focus on tantalum, among others. The most advanced of its projects is the Separation Rapids rare metals project near Kenora, Ontario, which includes the Big Whopper pegmatite, now in the feasibility stage. Three other tantalum properties are in their early stages, says the firm, whose aim is 'low cost, highly profitable production'. The Big Whopper, so christened by Dr Fred Breaks of the Ontario Geological Survey when he discovered it in 1996, is one of the largest pegmatites in the world. A new flowsheet put forward for Separation Rapids named lithium feldspars as the main product and tantalum as a potential by-product – drilling to define tantalum-rich subzones was planned. Commercial production is expected in 2004.

In February to September 2001 Avalon undertook exploration of Lilypad Lakes, East Braintree and Raleigh Lake. New tantalum occurrences were found with relatively high grade tantalum minerals including some microlite with 79% Ta_2O_5.

Two Canadian companies are also involved in Alaska: the Kougarok deposit on Alaska's Seward Peninsula is being re-prospected by two Canadian companies, Chapleau Resources Limited and Navigator Exploration, of Vancouver. The partnership believes that the mineral potential at Kougarok could be 20 000-30 000 tonnes of tantalum pentoxide.

Canadian firms Champlain Resources and Waseco Resources have joined forces to pursue work on the Brazil Lake tantalum project in Nova Scotia. Champlain was also looking for partners to carry out more detailed work on the Bluenose property in Nova Scotia, a 'classical tantalum apogranite system of sheeted pegmatites' described by Champlain thus: 'as good as it gets in exploration'.

War Eagle Mining Company, of Vancouver, announced in December 2001 positive results from its MAC property in the MacKenzie Mountains, North West Territories. Samples (from parts of the property given witty names such as Hadrian's Wall, Berlin Wall and Great Wall of China) were described as having encouraging values of Ta_2O_5.

(continued on page 6)

Flags welcomed the delegates on their arrival at the CBMM mine site

Gala dinner hosted by CBMM

Dr. Camargo, President of CBMM, and Dr Hoppe (right), H.C. Starck, President of T.I.C. 2001-2002

Delegates enjoying the evening

Delegates pictured at the T.I.C. Arboretum

Photographs courtesy of CBMM

Toronto-based Platinova A/S announced in October 2001 encouraging results of its sampling and drilling programme at the Case tantalum project in Ontario. Ta:Nb ratios between 2.5:1 and 3:1 were found, with Ta_2O_5 percentages which prompted the company to go ahead at once with evaluation of gravity concentration methods. This company is also working on tantalum projects in Lamaune, Ontario, and in Greenland.

General Minerals, a Canadian company but with headquarters in Denver, Colorado, has been conducting tests in Bolivia, where it has found both pegmatites and alluvial tantalite. In October 2001 it made a major reduction in activities to focus on tantalum and gold, and in February 2002 it announced results showing good potential for its exploration projects in eastern Bolivia.

There have been recent reports of new developments involving tantalum in China. Xinjiang Western Tantalum Works started mining at Aletei, Xinjiang in the autumn of 2001, producing 30-40tpy, and was looking at two more sites, according to Metal-Pages. Jiangxi Province was making the development of mineral resources, including tantalum and niobium, a priority for 2002, said the same source.

Nigeria has been a source of tantalite and columbite minerals for many years. The state-owned Nigerian Mining Corporation is seeking joint ventures to develop and market its mineral resources. It has started producing columbite and cassiterite from one mine, and is looking to explore another three 'world-class deposits' of tantalite which it believes hold at least 2 million tonnes (Metal Bulletin).

Australia is well-known, of course, for its mineral resources and for developing these, and searches for tantalum continue apace. Galaxy Resources of Perth is aiming to carry out an extensive drilling programme at North Ravensthorpe, also in West Australia. Alkane Exploration, Perth, has appointed a manager for a definitive feasibility study of the Dubbo Zirconia project: measured and inferred resources have been evaluated, and development continues. Quantum Resources reported significant tantalum results, with tin and niobium also present, from its exploration of the Cobalark project, in Western Australia. Another Western Australian company, Julia Mines Corporation, is aiming to work on the Bynoe and Shoobridge tantalum project near Darwin, and to explore for tantalite in other potentially useful regions of Northern Territory and Western Australia.

The observation of Bjørn Lomborg in 'The Skeptical Environmentalist' that reserves of tantalum raw materials have dropped to a point where the decrease is 'serious' is strange. Lomborg says that new deposits of materials are found when a specific search for them is undertaken. But he takes tantalum as an exception to that rule, whereas reports such as those included in this article indicate that the principle applies to tantalum just as well as to other metals.

Vectis Tin Mines
Vectis Tin Mines is a prospective applicant for membership of the T.I.C. and is looking to produce raw materials. The company is trying to develop its tantalum mines in Nigeria, and would like to find associates and partners to work with it.
Telephone/fax: +44 207 266 2776,
e-mail: amouktarm@hotmail.com.

MEMBER COMPANY NEWS

Angus and Ross

On February 14th 2002 Angus and Ross reported on the 'excellent results' of its drilling programme: more than 500ppm Ta_2O_5 had been found over an appreciable area in the Motzfeldt deposit, Greenland, being explored under the company's licences. The company said it was 'enthusiastic' about the results, and was recommending an expansion of drilling and associated studies. Potential problems with the location of the mine in mountainous terrain were solvable, and success was also reported with separation of tantalum from the samples of complex mineral brought from the site.

Cabot Corporation owns nearly 20% of Angus and Ross, and in 2001 entered into an agreement which gave Cabot the rights to buy up to 50% of any eventual tantalum production by the exploration and mining firm.

AVX

Reporting on the quarter ended December 2001, CEO and President Mr Gilbertson said that sales were comparable to the September quarter, and although sales had picked up in the quarter for production of Christmas presents selling prices of components 'were under heavy pressure as the capacity in the industry remains in excess of near term demand'. The outlook for the first quarter of 2002 was not too bright and 'expectations of growth have been pushed into the second half of calendar 2002'. Cost reduction including decreases in the number of workers would continue. The company reported a net loss of $6 million for the December quarter 2001 compared with net income of $166 million for the same quarter of 2000.

Cabot Performance Materials

For the quarter ended December 31st 2001, Cabot Corporation announced earnings for the Performance Materials business which were $34 million higher than in the same quarter of 2000 'due to higher prices and lower raw material costs'. In this period of 2000, CPM had 'suffered from higher raw material costs that we were not able to pass on to our customers'. Mr Burnes, Chairman and CEO of Cabot Corporation commented that the market for tantalum powder had been weak, and although volumes were lower profits were higher due to higher selling prices. Results for the quarter were very strong given the state of the economy, primarily driven by the tantalum business, added Mr Burnes, but his outlook was cautious because of uncertainty of a variety of conditions.

Cabot/Showa Cabot

Showa Cabot Supermetals was owned 50% by Showa Denko and 50% by Cabot. At the end of January 2002 Showa Denko was re-structuring in order to reduce interest-bearing debt, and was willing to sell its stake in Showa Cabot. Cabot therefore purchased the rest of Showa Cabot Supermetals. Mr Burnes said 'This purchase is consistent with our strategy of investing in our core businesses. It demonstrates our commitment to the tantalum business'.

Mr Yasuto Komatsu will be named President of the new company, to be known as Cabot Supermetals K.K., continued the press release.

Cambior

Cambior reported sales of 360 tonnes of niobium for the fourth

quarter of 2001, bringing total sales for the year 2001 to 1380 tonnes. Cambior's share of production was 430 tonnes of niobium for the quarter, and 1503 tonnes for the year. The company expects that its share of production in 2002 will be 1555 tonnes, a further increase in output, as its production for 2000 was 1085 tonnes.

On January 31st 2002 Cambior announced that its mineral reserves had been increased by nearly 60% by estimation from drilling results and an updated evaluation taking into account lower production costs and higher mining recovery. Proven reserves were 11 666 tonnes at an average grade of 0.65% Nb_2O_5, and probable reserves were 6490 tonnes at an average 0.72%, giving a total of 18 156 tonnes at 0.68% by the end of 2001 compared with 11 480 at 0.73% at the beginning of the year. This meant an increase of mine life to at least 16 more years at the current mining rate, said Mr Louis Gignac, President and CEO, and he expressed confidence that more reserves would be found. Plans to increase production gradually by 20% would maintain the company's market share of ferroniobium.

Sons of Gwalia

Celebrating the official opening of the Greenbushes expansion project on March 7th 2002, State Development Minister for Western Australia Mr Clive Brown said that the project would contribute significantly to the State's reputation of being a resource-rich powerhouse.

'Sons of Gwalia has the world's largest tantalum resource and is the world's biggest single tantalum miner.' The increased production from Greenbushes, with that from the company's Wodgina mine in the Pilbara – also being expanded, will increase the company's world market share to nearly 40%. In a year's time Sons of Gwalia will have the capacity to produce over three million pounds of tantalum pentoxide annually.

In February 2002 Sons of Gwalia reported record sales of 816 699lb tantalum from its Greenbushes and Wodgina mines in July-December 2001, compared with 601 013lb for the same period in 2000. Greenbushes produced 458 294lb and Wodgina 358 405lb, and their expected output for January-June 2002 is 630 000lb and 500 000lb, respectively.

In an article published in December 2001, Mr Peter Lalor, Executive Chairman of Sons of Gwalia, said that the perceived shortage of tantalum raw materials in the second half of 2000 was not a real shortage. Overzealous growth expectations and lack of communication and management in the supply chain, coupled with purchases of raw materials by some companies instead of the products they required for their use, had exacerbated some tightness in the supply chain. Sons of Gwalia was delivering increasing quantities of raw materials, it continued to review the possibility of increasing production further should the tantalum market require this, and it was expecting to establish 'considerable on-site inventories' to reassure industry consumers.

Haddington International Resources

In February 2002 Haddington announced a resource increase of almost 30% at its Bald Hill project, bring the figures to 1 484 000 tonnes at 466ppm Ta_2O_5, containing approximately 1.5 million pounds of tantalite.

At the same time it announced 'maiden first-half production results' of concentrate with 62 947lb contained tantalum pentoxide, from processing 96 050 tonnes of ore. The mine is 100% owned by Haddington and sells its concentrates to Sons of Gwalia under a long-term licence agreement.

Hi-Temp Specialty Metals

On Friday January 25th 2002, Hi-Temp Specialty Metals Inc. suffered an accident with tragic results. One worker was killed, and several others endured significant injuries.

The company announced that it was open again for business from Monday January 28th, paying tribute to the diligent work of local and state officials and employees, and its own employees. The company was thus quickly back in a position to receive orders and make deliveries of tantalum, tungsten and molybdenum. Only the chemical room was extensively damaged, so the company's chemical work was being carried out elsewhere while exhaustive investigations were under way. Once these are completed, the chemical room will be re-built.

Kemet

Mr Charles Culbertson II has left Kemet Corporation, where he was President and Chief Operating Officer, to pursue other opportunities. He had been with Kemet for 21 years.

The nominated delegate of Kemet to the T.I.C. is now Mr David A. Reynolds. Mr Reynolds' telephone number is +1 864 963 6395, fax +1 864 228 4081. E-mail to the company can be addressed to Capmaster@Kemet.com.

An article entitled 'Nb capacitors compared to Ta capacitors as a less costly alternative' has been posted on the Kemet web site, at www.kemet.com. This 'Tech Topic' is intended to provide customers 'with the facts about niobium capacitors as compared to tantalum capacitors, specifically their demonstrated performance data, physical properties, and cost'.

Among the conclusions drawn by the article:

1. Niobium capacitors that are similar in performance to tantalum capacitors can be made. Leakage and low-frequency DF will be higher, but the parts will perform acceptably in many applications.
2. The price of the niobium capacitors can be less than the price of similar tantalum capacitors, provided that niobium powder can be made at a CV/g approximately twice as high and at a lower powder cost than tantalum.

For the December quarter 2001 Kemet's sales were 69% lower than for the December quarter of 2000, at $117.3 million compared to 374.9 million. Mr David Maguire, Chairman and CEO, stated that 'In the December 2001 quarter, total unit shipments increased from the prior quarter for the first time in four quarters, while average selling prices declined approximately 10%. We anticipate that unit shipments will continue to increase, which will allow us to reduce inventory and generate cash during calendar 2002. Major cost saving initiatives occurring throughout 2001 have positioned Kemet to maintain a strong financial position and further enhance our earnings capability'. He went on to outline the 'drivers of growth' for Kemet as the growth phase of the current cycle approached, and noted a consensus among analysts that electronic end markets should resume growth by the second half of 2002.

NEC

NEC Corporation announced in January 2002 that it intended to reduce its global workforce by 9.3%, amounting to 14 000 jobs, by the end of March, reported the Japan Times. The company expected its first ever group operating loss for the business year 2001, and group sales were 9.5% lower than in the previous year. Restructuring and continuing to streamline its operations was NEC's means of countering the global downturn in the information technology industry.

Ningxia/Northwest

Ningxia Non-ferrous Metals Smelter and Northwest Institute for Non-ferrous Metals Research, both T.I.C. members, were among a group of eight companies which have decided to set up a new company, Ningxia Orient Special Material Science and Technology Development Ltd.

Sogem

Former member of the UN Panel of Experts Mr Henry Maire has written an open letter to IPIS, giving his personal opinions, following the UN report and other reports on 'coltan' trade in the DRC. He sent the text of his letter to Sogem, at whose request we now print these extracts from his letter:

'The report does not differentiate between the activities of (1) Groups engaged in "normal" commercial activities related with the acquisition of resources produced legally from Congolese citizens involved in artisanal and small-scale operations, from (2) those Groups constituted exclusively to take advantage of an economic windfall for personal profit and/or with the objective to feed the military machine. Characteristically the first Group acts with transparence and through its activities enhances the potential for development of local entrepreneurs. The second Group is oriented exclusively toward the forceful (often military controlled) production of the minerals (coltan) by any means, including the use of prisoners of all sources, forced labor, etc., and using any transport available, such as provided by the military and other ad-hoc contractor. It usually takes advantage of international criminal networks for the marketing of its products. In that scenario the impact on the DRC is disastrous in both economic as well as human aspects.

In the case of SOGEM for instance, which you target in your Case Study [IPIS], the report fails to mention that the Group was active and operated legally in the region with Congolese partners, for a considerable time before the events. Its activities became suspicious in your view, only after politics managed to give a new meaning and purpose to the exploitation of the natural Resources of the Region.

Economic desirability [of 'coltan'] has diminished drastically since the time its value reached its temporary peak. It has now returned to a more normal level. Profit margins are considerably less appetizing for the criminal sector which appears to have turned toward the more lucrative fields of the diamond, woods and other natural resources. An embargo would hit the artisanal and small-scale mining sector. That is to say that it would penalize the people who have no other choice but to look for and extract the minerals for their survival. .....

The development and the exploitation of natural resources (minerals, agricultural, forestry, etc) should resume its role of being the engine of the regional and National Economy, with the assistance of EU and other Organizations. Emphasis must be given to a massive re-construction effort, a return to some level of transparency, credibility and fairness in the administration of National Laws and regulations, once security has been normalized.'

Tantalum Australia

During January 2002 the company made rapid progress towards a feasibility study on its 100% owned Mount Deans project, where its drilling programme had established the existence of a deposit of 4 million lb contained tantalum pentoxide. Treatment would be carried out at the company's own plant, formerly used for gold, at nearby Norseman. The local council at Norseman was excited about the establishment of the new enterprise, with jobs for up to 30 people.

The company's plant at Dalgaranga, where another of its deposits is located, is beginning to produce concentrates.

Tantalum Australia/Kemet

Tantalum Australia was set up as a joint venture 50/50 between Australasian Gold and Kemet. In early 2002 Tantalum Australia acquired Kemet's shareholding, so that Australasian Gold took back control of its tantalum business. Changes in the sales agreements ended the 'take-off agreement' through which Kemet bought Tantalum Australia's products, although Kemet maintained its 10% shareholding in Australasian Gold and kept a place on the board of that company. In February Mr Harris Crowley of Kemet became a Director in place of Mr Charles Culbertson II.

Vishay

In September 2001 Vishay announced a new manufacturing technique to produce solid niobium capacitors with MnO_2 cathode which could be used as drop-in replacements for devices built with tantalum. In a subsequent article, Mr Maden and Dr Pozdeev-Freeman wrote ' Niobium is and always has been the only anode material that could possibly work as a substitute for tantalum in solid electrolytic capacitors', noting that tantalum and niobium are so similar that for a long time they were thought to be the same element. Making niobium capacitors with performance equal to that of tantalum capacitors is not easy, conclude the authors, but with much research effort and development of special techniques, Vishay is able to produce niobium capacitors with the same operating temperature range, the same DC leakage and the same ESR as tantalum.
At the same time, Vishay pursues its development of tantalum capacitors: on February 15th it announced the release of two additions to its solid chip capacitor range, the industry's highest available capacitance ratings in low profile X and Y case sizes, claims the firm.

Dr Zandman, Chairman and CEO of Vishay Intertechnology, announced on February 7th 2002 that sales for the fourth quarter of 2001 were 60% of those for the fourth quarter of 2000, and sales for the year were $1655 million, compared to $2465 million for the year 2000. Net earnings for the year 2001 were $0.5 million. Sales for 2001 were 33% below those of 2000, and the company had reduced its workforce by 7000 (31%). Describing the quarter and the year as 'very disappointing', Dr Zandman observed that semiconductor bookings had already begun to increase, and he looked forward with 'confidence and optimism' to the recovery of the electronic markets.