TANIOBIS
Innovative Powders

www.taniobis.com
Tantalum and Niobium – Innovative Materials

Tantalum and niobium metal powders have a positive impact on our daily life. With their outstanding properties, they actively shape the development of future technologies.

Tantalum is characterized by having the fourth-highest melting point of all metals, a very high density, and good thermal and electrical conductivity. Due to its ability to form an extremely thin, tough, fully dense and protective oxide layer, it is outstanding for use in capacitor applications. Niobium is a ductile, oxidation and corrosion-resistant metal which improves material properties, often leading to the increased efficiency, safety and performance of end products.

The extraordinary properties of tantalum and niobium facilitate technological progress, including the IoT (Internet of Things), AI (Artificial Intelligence), smart factories, E-Mobility, or vehicle-to-vehicle communication. These materials are our passion; to utilize their innovative potential for future trends is our mission. Our experienced team can support you in the development of efficient and powerful solutions for existing and new application fields.
A fundamental trend in consumer electronics is miniaturization. Smaller devices are expected to provide an ever increasing level of performance with more functions. Tantalum plays a crucial role in this trend.

The miniaturization of end devices, such as smartphones or notebooks, is supported by very high-capacitance tantalum capacitors, which achieve maximum energy density with a low footprint, thanks to their unique volume efficiency.

Moreover, our newly developed tantalum paste technology offers an innovative way to achieve ultra-thin capacitor designs and the increased volumetric efficiency of capacitance.
About TANIOBIS

A leading market position with the highest level of expertise in Ta- and Nb-based materials

TANIOBIS is a leading global producer of high-quality tantalum and niobium-based materials. We have more than 60 years of experience in the development and manufacture of high-performance tantalum and niobium metal powders for capacitors and sputter targets, high-purity oxides for the optical industry, and other specialty compounds including hydroxides, chlorides, oxalates, as well as alloys such as nickel niobium.

Our core competencies within the value chain

- Raw material digestion
- Liquid-liquid extraction process
- K₂TaF₇
- Na reduction
- Mg reduction
- Provides flowability
- Optimizes particle morphology
- Further purification (deoxygenation)

Our highly-qualified R&D team develops specific product solutions targeted at the coming market trends, such as the Internet of Things (IoT), vehicle-to-vehicle communication, smart factories and additive manufacturing technologies.

Our company operates four production facilities located in Goslar and Laufenburg, Germany; Mito, Japan and Map Ta Phut, Thailand.

During the last decades, we have developed expertise to process tantalum and niobium containing primary and secondary raw materials into high-performance powders for diverse application fields.

Raw material sourcing
- Tantalum and niobium ores
- Slags and residues
- Scrap

Pre-processing & concentration
- Concentration of low-grade raw materials by a multi-stage process in a smelting facility
- Liquid-liquid extraction process
- K₂TaF₇
- Na reduction
- Mg reduction

Separation of tantalum and niobium
- Raw material digestion
- Liquid-liquid extraction process
- Na reduction
- Mg reduction

Precipitation of precursors & products
- K₂TaF₇
- Ta₂O₅
- Nb₂O₅
- Provides flowability
- Optimizes particle morphology
- Further purification (deoxygenation)

Reduction to metal
- Na reduction
- Mg reduction

Refining powder
- Na reduction
- Mg reduction
- Provides flowability
- Optimizes particle morphology
- Further purification (deoxygenation)

Continuous quality assurance
Highest Reliability in Future Technologies

Our products are characterized by their consistent high quality. With our experience and expertise in application technology, we can provide engineered product solutions to your demanding, technically-challenging and unique requirements. We provide high-quality tantalum and niobium powders in six main product groups: capacitor materials, high-purity metal powders, specialty oxides, alloy additives, powders for additive manufacturing, and compounds & chlorides.

Technological Expertise for Customized Solutions

The clear majority of our tantalum and niobium products are tailor-made, based on customer specifications. The close collaboration and partnership with our customers allows us to provide materials fully adapted to their processes and is one of our core competencies. This requires the ability to adjust not only the composition, but also the purity and morphology of the powder to achieve the required result. Our team draws upon deep material knowledge, unique equipment and strong process expertise in hydrometallurgy, high-temperature processes and mechanical treatments for the development and production of tailor-made materials.

Market segments
- Capacitor materials
- High-purity metal powders
- Alloy additives
- Specialty oxides
- Powders for additive manufacturing
- Compounds & chlorides

Key product groups
- Tantalum capacitor powders
  - High CV\(^1\) powders
  - Mid CV powder
  - High Voltage powder
- Metal powders
  - for sputter targets
  - for sinter applications
- Alloy Additives
  - NNb (40/60)
  - Niobium oxide (Nb₂O₅)
- Specialty oxides
  - High-purity Ta₂O₅
  - High-purity Nb₂O₅
- AMTinski® Ta- and Nb-based powders and their alloys
- Customized multinary alloys
- AMPerTEC® Chlorides
- Compounds

Typical applications
- Notebooks, tablets, mobiles, TVs
- Telecom infrastructure
- Connected car
- Semiconductors
- DRAM and NAND Flash
- Integrated circuit chips
- Jet engine and industrial gas turbines
- Oil & gas infrastructure
- Medical and dental implants
- Superconductivity
- Aerospace engine systems
- CVD precursor
- Piezo components

\(^1\) CV refers to Capacitance and Voltage
Our mobility behavior will change radically in the years to come. Forecasts predict that, by 2030, autonomous mobility could rise to 40%, and over 55% of all car sales will involve fully-electrified vehicles. Automotive electronics encompass a wide range of applications, from cabin entertainment, airbags and ABS, to ADAS (Advanced Driver Assistance Systems).

Due to their ideal properties, including enhanced reliability, a wide temperature range and low leakage, high-voltage tantalum capacitor powders are the perfect base for capacitors used in electronic mobility applications, contributing to increased vehicle reliability and passenger safety.
Sustainable Material Supply

Our raw material procurement strategy is based on two pillars: the responsible and ethical sourcing of primary materials, as well as the recycling of secondary materials (scraps, slags). With unique expertise, we recover tantalum and niobium scraps from various industries (e.g., aviation), and return them into the supply chain, ensuring the sustainable use of resources.

Recycling of valuable materials (direct and through the recycling market)

Conflict-Free Smelter

TANiOBIS is at the forefront of the tantalum industry and we consider responsible and ethical raw material sourcing to be one of our core competencies.

Our activities are based on the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk areas.

We apply the due diligence systems of the:
- iTSCi (international Tin Supply Chain initiative – Full member)
- Responsible Minerals Initiative (RMI – Full Member), and
- Responsible Supply Chain Management (RSCM – internal supplier qualification system) to formalize the supervision and selection of mining, as well as trading activities.

We are a conflict-free smelter and conformant with the Responsible Minerals Assurance Process assessment protocols (RMAP) (formerly known as CFSP Compliant Smelters & Refiners) for all our manufacturing sites.

Our Process Excellence

Our innovative tantalum and niobium recycling processes allow us to reclaim tantalum and niobium from almost any type of tantalum and niobium-containing scrap or production by-products, and reintroduce them into the value chain with the same powder characteristics. Depending on the required product, our experienced team manufactures tantalum and niobium powders and compounds in the following production steps: pyro-metallurgy, hydro-metallurgy or powder metallurgy.
Oxides

Our product range features a comprehensive spectrum of tantalum pentoxide (Ta₂O₅) grades and niobium pentoxide (Nb₂O₅) grades adapted for a wide variety of applications and markets. With a deep understanding of the different requirements, in terms of chemical purity and morphology, and thanks to intensive customer cooperation, we can improve product properties with respect to the continuously changing requirements of the specific applications.

<table>
<thead>
<tr>
<th>Tantalum Pentoxide Ta₂O₅</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical-Pure Grade</td>
<td>99.9%</td>
<td>D10% &lt; 1 μm, D50% &lt; 2 μm, D90% &lt; 100 μm</td>
<td>• Carbides, Catalysts, Refractories, Alloy additives</td>
</tr>
<tr>
<td>Ceramic Grade</td>
<td>99.9%</td>
<td>D10% &lt; 0.5 μm, D50% &lt; 2 μm, D90% &lt; 5 μm</td>
<td>• Carbides, Ceramics, Electroceramics, Pigments</td>
</tr>
<tr>
<td>High-Purity Optical Grade</td>
<td>99.98%</td>
<td>HPO 400: screened to be finer than 400 μm, HPO 600: screened to be finer than 600 μm, HPO 1000: not screened or screened to be finer than 1000 μm</td>
<td>• Optical lenses</td>
</tr>
<tr>
<td>High-Purity Optical Grade A</td>
<td>99.99%</td>
<td>D10% &lt; 20 μm, D50% &lt; 40 μm, D90% &lt; 60 μm</td>
<td>• Optical lenses, Sputter targets</td>
</tr>
<tr>
<td>Grade LT</td>
<td>99.995%</td>
<td>D10% &lt; 0.3 - 0.5 μm, D50% &lt; 1.0 - 2.0 μm, D90% 5.0 - 60 μm</td>
<td>• Optical lenses, Sputter targets, Single crystals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Niobium Pentoxide Nb₂O₅</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metallurgical Grade</td>
<td>99.0%</td>
<td>D10% &lt; 1 μm, D50% &lt; 2 μm, D90% &lt; 100 μm</td>
<td>• Alloy additives, Super alloys</td>
</tr>
<tr>
<td>Chemical-Pure Grade</td>
<td>99.9%</td>
<td>D10% &lt; 1 μm, D50% &lt; 2 μm, D90% &lt; 100 μm</td>
<td>• Carbides, Catalysts, Refractories, Pigments</td>
</tr>
<tr>
<td>Ceramic Grade</td>
<td>99.9%</td>
<td>D10% &lt; 0.5 μm, D50% &lt; 1 μm, D90% &lt; 2 μm</td>
<td>• Carbides, Piezoceramics ferrites, MLCC, Pigments</td>
</tr>
<tr>
<td>High-Purity Optical Grade</td>
<td>99.99%</td>
<td>HPO 400: screened to be finer than 400 μm, HPO 600: screened to be finer than 600 μm, HPO 1000: not screened or screened to be finer than 1000 μm</td>
<td>• Optical lenses, Coatings</td>
</tr>
</tbody>
</table>

Niobium Pentoxide Nb₂O₅

Lithium Niobate Grade (LN) 99.995% D10% 1.0 - 1.5 μm, D50% 4.0 - 7.0 μm, D90% 20 - 100 μm • Single crystal, High-purity applications
Sputter Target Grade (SFT-A) 99.995% D10 > 15 μm, D50 25 - 50 μm, D90 40 - 70 μm • Sputter targets

Niobium Hydroxide

Our niobium hydroxide (Nb(OH)₅) is used as a niobium precursor for the production of niobium compounds, among others for catalysis and electroceramics. As a non-calcined powder, with a water content of 30 - 60%, Nb(OH)₅ is an ideal starting material for homogenous doping.

<table>
<thead>
<tr>
<th>Nb(OH)₅</th>
<th>Chemical Characteristics</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moist</td>
<td>Nb₂O₅ min. 30% F max. 0.5% Loss on ignition, max. 70% Na₂O 3 - 5%</td>
<td>• Niobium precursor for the production of niobium compounds, e.g. for catalysis and electroceramics</td>
<td></td>
</tr>
<tr>
<td>Milled</td>
<td>Nb₂O₅ min. 60% F max. 0.5% Loss on ignition, max. 40% Na₂O 3 - 5%</td>
<td>D10% &lt; 2 μm, D50% &lt; 10 μm, D90% &lt; 80 μm</td>
<td></td>
</tr>
<tr>
<td>Crushed</td>
<td>Nb₂O₅ min. 60% F max. 0.5% Loss on ignition, max. 40% Na₂O 3 - 5%</td>
<td>D10% &lt; 2 μm, D50% &lt; 10 μm, D90% &lt; 80 μm</td>
<td></td>
</tr>
</tbody>
</table>
High-volume data connectivity is an integral part of today’s technological progress; the rapid growth of wireless data access and the need for high-speed data processing is greater than ever before. Electronic devices are becoming faster, smaller, more connected, and more energy-efficient. The Internet of Things, smart grids, smart factories and vehicle-to-vehicle communication cannot work efficiently without our tantalum and niobium powders. Our innovative approach makes it possible to develop thinner and smaller electronic devices with comprehensive functionality, thus providing a continuous contribution to better global connectivity.
We provide a wide range of tantalum and niobium-based metal powders for capacitors used in applications, including vehicle electronics, ignition and engine control modules, as well as aerospace and defense technology.

We supply many different tantalum and niobium powders optimized for all voltage ranges. High-voltage capacitor powders, for example, play an important role in areas where safety and low breakdown rates are highly significant, such as in medicine (Implantable Cardioverter Defibrillator – ICD) or automotive.

Due to their high degree of purity and high quality, our tantalum and niobium ‘high-purity’ powders are used in aviation and energy industry applications as alloy additives for corrosion-resistant turbine blades. In medical technology, the powders are used as radiographic contrast agents and in the production of bone replacement material and implants.

Moreover, our product portfolio includes tantalum pastes for ultra-thin electronic devices, as well as Ta- and Nb-based powders for various application technologies, like additive manufacturing.
AMPERTEC® Chlorides

Niobium and Tantalum Pentachloride

Our AMPERTEC® niobium and tantalum pentachlorides (NbCl₅ and TaCl₅) are highly-reactive compounds of niobium and tantalum. Due to the reduced surface area, e.g. larger particle size, the compounds are associated with less dust formation, reduced moisture sensitivity and improved handling in dosage. AMPERTEC® pentachlorides, with the highest purity or semiconductor grade, are the purest of their kind currently available on the market, in large scale production.

Tungsten Hexachloride

Thanks to its superfine particle size and its strong reactivity, AMPERTEC® tungsten hexachloride particularly meets the special requirements of catalytic applications.

Molybdenum Pentachloride


<table>
<thead>
<tr>
<th>AMPERTEC® Niobium Pentachloride NbCl₅</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest-Purity Grade</td>
<td>99.995%</td>
<td>Particle Size: &lt; 3 mm</td>
<td>• CVD precursor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: yellow crystals</td>
<td>• Synthesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melting point: 204 °C</td>
<td>• Catalysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bulk density: ca. 0.17 g/cm³</td>
<td>• Coating</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• MLCC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AMPERTEC® Tantalum Pentachloride TaCl₅</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest-Purity Grade</td>
<td>99.995%</td>
<td>Particle Size: &lt; 3 mm</td>
<td>• CVD precursor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: white crystals</td>
<td>• Synthesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melting point: 216 °C</td>
<td>• Catalysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bulk density: 0.19 - 0.24 g/cm²</td>
<td>• Coating</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Semiconductor applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AMPERTEC® Tungsten Hexachloride WCl₆</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCl₆</td>
<td>99.9%</td>
<td>Particle Size: &lt; 2 mm</td>
<td>• Catalysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: black-violet crystals</td>
<td>• CVD precursor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melting point: 282 °C</td>
<td>• Synthesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bulk density: 0.12 g/cm³</td>
<td>• Semiconductor applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AMPERTEC® Molybdenum Pentachloride MoCl₅</th>
<th>Purity min.</th>
<th>Physical Characteristics</th>
<th>Main Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MoCl₅</td>
<td>99.9%</td>
<td>Particle Size: &lt; 2 mm</td>
<td>• Catalysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description: black crystals</td>
<td>• CVD precursor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melting point: 194 °C</td>
<td>• Synthesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bulk density: 0.05 g/cm³</td>
<td>• Semiconductor applications</td>
</tr>
</tbody>
</table>
Compounds

Our niobium ammonium oxalate (NAmOx) is a white, crystalline powder that is stable in air and completely water-soluble. NAmOx allows the obtaining of clear solutions containing 40 - 160 g/l Nb. The powder provides an excellent niobium solution with high homogeneity, without using organic solvents. NAmOx is therefore beneficial as a precursor for the production of niobium-doped catalysts.

NAmOx

<table>
<thead>
<tr>
<th>Chemical Characteristics</th>
<th>Solubility</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nb min. 19% C₂O₄ typ. 50 - 65% NH₃ min. 2%</td>
<td>60 - 230 g/l Nb₂O₅ (≈40 - 160 g/l Nb at 20 - 70 °C)</td>
<td>Production of catalysts, ferrites, electroceramics and pigments</td>
</tr>
</tbody>
</table>

In addition to the NAmOx powder, we offer aqueous solutions of niobium and tantalum oxalate.

Our niobium and tantalum oxalate solutions are an ideal precursor for mixtures at an atomic level.

Aqueous Solution of

<table>
<thead>
<tr>
<th>Chemical Characteristics</th>
<th>Typical Content</th>
<th>Density</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nb-Oxalate</td>
<td>NbO₄ typ. 90 - 270 g/l C₂O₄ typ. 150 - 400 g/l Cl max. 50 mg/l F max. 100 mg/l</td>
<td>1.15 - 1.40 g/ml³</td>
<td>Catalytic converters, ferrites, electroceramics and pigments</td>
</tr>
<tr>
<td>Ta-Oxalate</td>
<td>TaO₄ typ. 150 - 200 g/l C₂O₄ typ. 110 - 160 g/l Cl max. 50 mg/l F max. 100 mg/l</td>
<td>1.10 - 1.30 g/ml³</td>
<td>Catalytic converters and electroceramics</td>
</tr>
</tbody>
</table>

Niobium Ammonium Oxalate

Niobates are inorganic compounds which consist of niobium, another metallic element and oxygen. These materials can be used for the production of electroceramic components, such as piezoceramics.

Niobates

<table>
<thead>
<tr>
<th>Chemical Characteristics</th>
<th>Solubility</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNbO₄</td>
<td>K 21.0 - 22.8% Nb 49.7 - 52.3% Loss on ignition max. 0.5%</td>
<td>Surface Area (BET) 2 - 4 m²/g D10% &lt; 2 μm D90% &lt; 10 μm</td>
</tr>
<tr>
<td>MgNbO₄</td>
<td>Mg 7.7 - 8.3% Nb 59.9 - 61.1% Loss on ignition max. 0.2%</td>
<td></td>
</tr>
</tbody>
</table>

Alloy Additives

Due to its high melting point and excellent oxidation and corrosion resistance, nickel niobium is a preferred component in superalloys used for parts that must withstand high temperatures. Moreover, nickel niobium compensates for high-tension stresses, as well as shocks caused by vibration and impact.

Refining steels with superalloys that contain niobium ensures optimized machine performance and fuel combustion, lower machine maintenance costs and a greater degree of safety. Nickel niobium slows material aging processes and prevents crack formation under thermal stress.

In addition to nickel niobium and oxide powders, we also offer tantalum bars. Due to their low oxygen content and good dosability they are very well-suited for alloy additives.

Product | Purity min. | Chemical / Physical Characteristics | Main Application |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel Niobium (NiNb)</td>
<td>40/60</td>
<td>58 - 65% Nb-content (lumpy &lt; 50mm)</td>
<td>Alloy additives</td>
</tr>
<tr>
<td>Tantalum Bars</td>
<td>99.9%</td>
<td>Low oxygen content</td>
<td>Alloy additives</td>
</tr>
<tr>
<td>Niobium Pentoxide Nb₂O₅ Metallurgical Grade</td>
<td>99.0%</td>
<td>Loss on ignition: max. 0.2% Tap density: 1.3 - 1.4 g/cm³ avg</td>
<td>Alloy additives</td>
</tr>
<tr>
<td>Tantalum Bars</td>
<td>99.9%</td>
<td>Available purity: Min. 99.9%</td>
<td>Alloy additives</td>
</tr>
</tbody>
</table>

Nickel Niobium

- Production method: Metallothermic Reduction
- Nb nominal range: 58 - 65 wt%
- Available shapes: Lumps
- Typical sizes: 5 x 50 mm
- Packaging: various

Tantalum Bar

- Low oxygen content (between 33 and 80 ppm)
- Low content of high-temperature elements like Mo, Nb and W, as well as iron
- Pure Ta: min. 99.9%
- Easy-to-dose pieces
  - Diameter: 30 mm/1.18"
  - Length: as required, (max. 90 cm/35.43")
AMtrinsic® Materials for Additive Manufacturing

Right in step with the latest market developments, and based on our long expertise in powder metallurgy, we have developed atomized AMtrinsic® spherical powders with the properties required by different additive manufacturing technologies. Our powders are characterized by excellent flowability, high tap density, a perfectly spherical shape and narrow particle size distribution.

<table>
<thead>
<tr>
<th>AMtrinsic® spherical</th>
<th>O (ppm)*</th>
<th>Flow Rate (s)*</th>
<th>Tap Density (g/cm³)*</th>
<th>Main Application</th>
</tr>
</thead>
</table>
| Ta                  | < 600    | 7 (0.1 inch)  | 10 - 11             | • Medical implants  
|                     |          | 1 (0.2 inch)  |                     | • Applications that combine high corrosion resistance with freedom of design  
|                     |          | 12 (0.1 inch) |                     | • Corrosion-resistant components and high-temperature applications in the chemical processing industries |
|                     |          | 2 (0.2 inch)  |                     | • Superconductor applications |
| Nb                  | < 600    | 33 (0.3 inch) | 3 - 4               | • Corrosion-resistant components and high-temperature applications  
|                     |          | 6 (0.2 inch)  |                     | • Next generation of customized medical implants  
|                     |          | 21 (0.1 inch) | 3 - 4               | • High-performance applications that require the combination of high elasticity and great strength |
| Ti42Nb              | < 3000   | 33 (0.3 inch) | 3 - 4               | • High-temperature application that requires great strength and good creep resistance |
| Ta/W                | < 600    | 8 (0.1 inch)  | 11 - 12             | • Heat and corrosion-resistant components, e.g. in aerospace applications |
| Nb/Ta/W/Zr (FS85)   | < 1600   | 9 (0.1 inch)  | 6 - 7               | • High-temperature application that requires great strength and good creep resistance |
| Ti/Ta               | Under development |             |                     | • High-temperature shape memory alloys  
|                     |          |                |                     | • Biomedical applications |
| Nb/Hf/Ti (C103)     | Under development |             |                     | • High stress resistance at extreme temperatures e.g. in aerospace applications |
| High-entropy alloys | Customer-specific compositions upon request |          |                     | • Heat and corrosion resistance |

* Reference value for exemplary lots with a grain size < 63 μm  
Other alloy compositions upon request

- Extremely low O content  
- High tap density  
- Spherical shape with smooth surfaces  
- Very good flowability

Excellent processability in 3D-printing, as well as in metal injection molding

AMtrinsic® spherical powders are pre-conditioned for application in Laser Beam Melting (10 - 63 μm), Electron Beam Melting (63 - 105 μm), Laser Metal Deposition (105 - 150 μm) or in accordance with customer requests.
Every person is unique. Optimum patient care in dentistry, orthopedics and implantology requires medical products that provide a perfect fit. Technologies, such as 3D-printing, open up entirely new ways of manufacturing custom-made components and highly complex elements that have, up to now, been simply unthinkable. 3D-printing technology, in combination with our new AMtrinsic® Spherical Tantalum and Niobium Powders and their alloys, make it possible to produce bio-compatible implants with outstanding mechanical properties, optimized for each patient.
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