

钛阳极

TITANIUM ANODE

合作·共赢·创新·发展

WIN-WIN COOPERATION AND INNOVATION

陕西锦瀚稀贵金属有限公司

ShaanXi JinHan Rare Precious Metals Co.,Ltd

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ShaanXi JinHan Rare Precious Metals Co.,Ltd

公司简介 COMPANY PROFILE



陕西锦瀚稀贵金属有限公司位于有着中国钛谷之称的——宝鸡，是电化学工业钛电极及民用钛材料、钛工艺生产加工的民营企业。公司拥有一支多年从事电化学钛阳极、钛电极的专业团队，把更好的产品和服务呈现给我们的客户。公司主要从事民用钛产品及钛基涂层电极的研发、生产加工及销售。主要产品为：钛电极（钌系钛电极、铱系钛电极、铂系钛电极、二氧化铅钛电极等）和钛民用礼品、餐厨具、工艺品等。公司依托“中国钛谷”雄厚的行业资源，强大的有色金属研发及制造实力，完整的钛工业制造产业链及构架形成以钛谷宝鸡为研发、生产、加工及销售中心，为客户提供专业、全面的服务。

本公司产品质量和信誉深受广大用户好评，倡导“专业、务实、高效、创新”的企业精神，具有良好的内部机制。优良的工作环境以及良好的激励机制，吸引了一批高素质、高水平、高效率的人才。拥有完善的技术研发力量和成熟的售后服务团队。我们的宗旨是：“用服务与真诚来换取你的信任与支持，互惠互利，共创双赢！”陕西锦瀚稀贵金属有限公司愿与国内外各界同仁志竭诚合作，共创未来！

ShaanXi JinHan Rare Precious Metals Co.,Ltd is located in Baoji, known as the Titanium Valley of China. It is a private enterprise engaged in the production and processing of electrochemical industry titanium electrodes, civilian titanium materials, and titanium processes. The company has a professional team that has been engaged in electrochemical titanium anodes and titanium electrodes for many years, presenting better products and services to our customers. The company is mainly engaged in the research and development, production, processing, and sales of civilian titanium products and titanium based coated electrodes. The main products are titanium electrodes (ruthenium based titanium electrodes, iridium based titanium electrodes, platinum based titanium electrodes, lead dioxide titanium electrodes, etc.) and titanium civilian gifts, kitchenware, handicrafts, etc. The company relies on the strong industry resources of "China Titanium Valley", strong research and manufacturing capabilities in non-ferrous metals, and a complete titanium industry manufacturing chain and structure, forming a research and development, production, processing, and sales center in Baoji, Titanium Valley, to provide customers with professional and comprehensive services.

Our company's product quality and reputation have been highly praised by a large number of users, advocating the corporate spirit of "professionalism, pragmatism, efficiency, and innovation", and having a good internal mechanism. The excellent working environment and good incentive mechanism have attracted a group of high-quality, high-level, and efficient talents. We have a comprehensive technical research and development team and a mature after-sales service team. Our aim is to exchange your trust and support with service and sincerity, achieve mutual benefit, and create a win-win situation. ShaanXi JinHan Rare Precious Metals Co.,Ltd.is will ing to cooperate wholeheartedly with colleagues from all walks of life at home and abroad to create a better future!

厂区环境 COMPANY PROFILE



产品简介

PRODUCT INTRODUCTION



钛阳极又称钛电极，国内外一般称为MMO（MixedMetalOxide）钛基金属氧化物涂层阳极，也叫DSA（DimensionallyStable Electrode）尺寸形状稳定型阳极。它以钛（板、棒、丝、管、网）为基材，在钛基材上涂覆贵金属涂层，使其具有良好的电催化活性、导电性和耐腐蚀性。与石墨阳极和铅阳极相比，钛阳极具有以下优点：

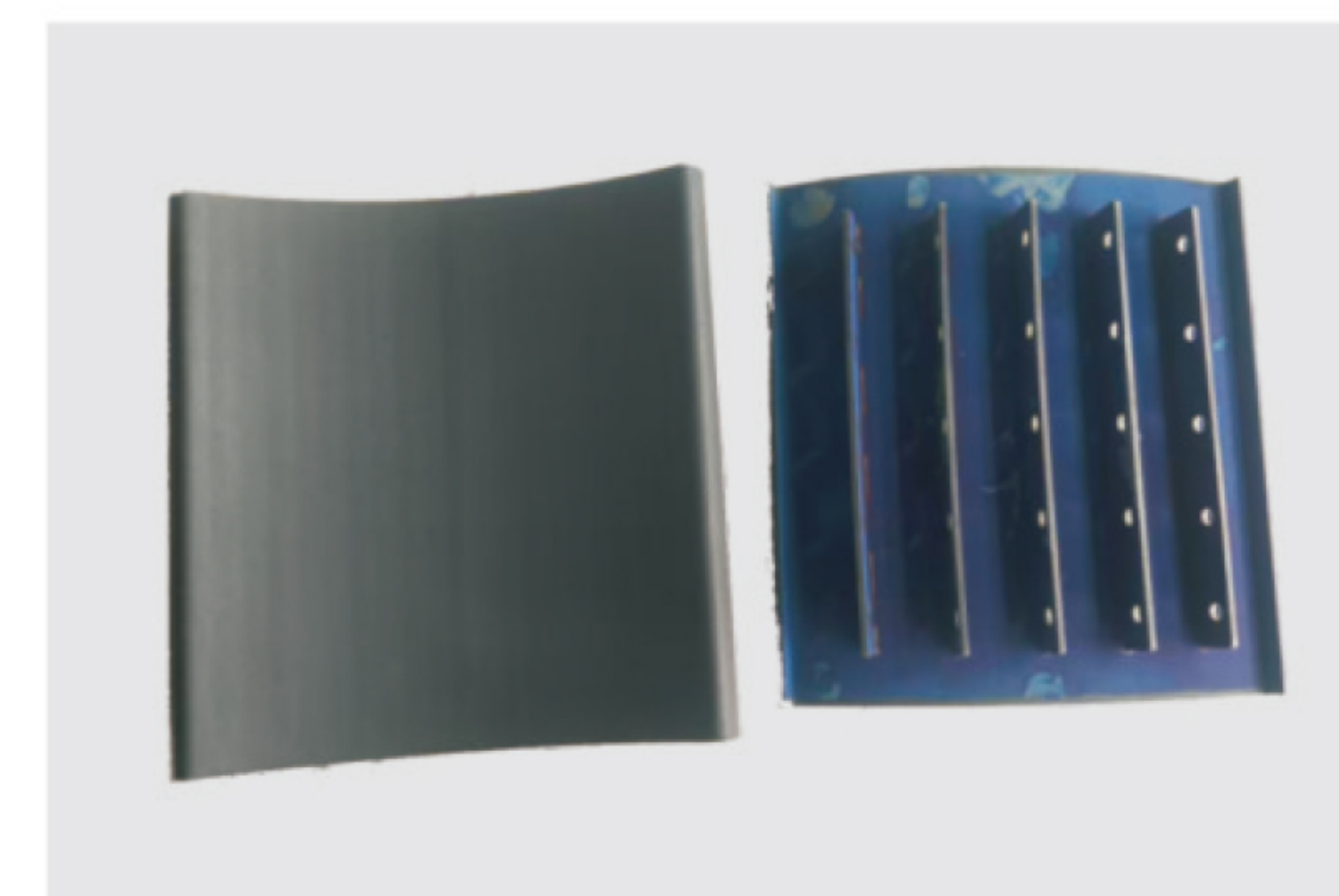
- ◆ 电极尺寸稳定：电解过程中电极间距离不会变化，确保电解操作在电压稳定的情况下进行。
- ◆ 电解效率高：工作电压低，电能消耗较小，直流电耗可降10%–20%。
- ◆ 工作寿命长：表面贵金属（铱、钌、铂）具有抗氧化性，因此钛阳极的耐腐蚀性较强，平均寿命可达5–7年，而石墨阳极只有8个月。

Titanium anode, also known as titanium electrode, is generally referred to as MMO (Mixed MetalOxide) titanium based metal oxide coated anode at home and abroad, or DSA (Dimensionally Stable Electrode) size and shape stable anode. It is made of titanium (plate, rod, wire, tube, mesh) as the substrate, coated with a precious metal coating on the titanium substrate, making it have good electrocatalytic activity, conductivity, and corrosion resistance. Compared with graphite anodes and lead anodes, titanium anodes have the following advantages:

- ◆ Stable electrode size: The distance between electrodes does not change during the electrolysis process, ensuring that the electrolysis operation is carried out under stable voltage conditions.
- ◆ High electrolysis efficiency: low working voltage, low energy consumption, and DC power consumption can be reduced by 10% –20%.
- ◆ Long working life: Surface precious metals (iridium, ruthenium, platinum) have oxidation resistance, so titanium anodes have strong corrosion resistance, with an average life of 5–7 years, while graphite anodes only have 8 months.

铱系钛阳极

IRIDIUM TITANIUM ANODE



产品参数 PRODUCT PARAMETERS

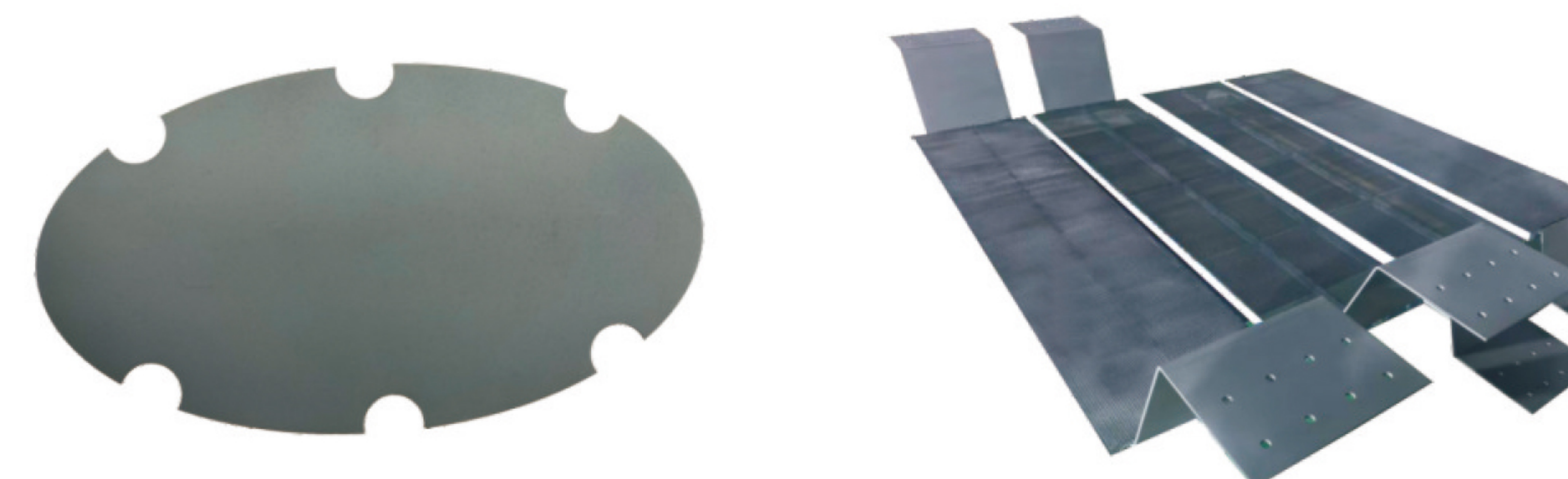
基材: Gr1、Gr2
工作电流范围: <18000A/m²
工作温度: <65℃
表面金属: IrO₂+Ta₂O₅
铱含量: 10–60g/m²
涂层厚度: 2–12 μm
产品形状: 网, 板, 管, 棒等
使用环境: PH值: 0–14

Substrate: Gr1 Gr2
Working current range: <18000A/ m²
Working temperature: <65° 0
Surface metal: IrO₂+Ta₂O₅
Iridium content: 10–60g/ m²
Coating thickness: 2–12um
Product shape: : mesh, plate, tube, rod, etc.
Usage environment: PH 0–14

应用领域 APPLICATION FIELDS

金属制箔、电解铜箔、钢板镀锌、阴极保护、有机物电解合成、电镀铬、蚀刻液再生及铜回收、旋流电解、湿法冶金、HHO发生器、污水处理等行业。

Metal Foil Making, Electrolytic Copper Foil, Steel Plate Galvanizing, Cathodic Protection, ElectrolyticSynthesis ofOrganics, Chromium Plating, Etching Liquid Regeneration and Copper Recycling, SwirlElectrolysis, Hydrometallurgy, HHO Generator, Wastewater Treatment and other industries.



电镀行业 ELECTROPLATING INDUSTRY

在电镀应用领域中，所需的镀层金属溶解于电解质中，被镀的金属基体则作为负电极，阳极用作为正电极，即形成了完整的电流传送循环。电镀时阳极表面析出氧气。

In the field of electroplating applications, the required coating metal dissolves in the electrolyte, and the plated metal substrate serves as the negative electrode, while the anode serves as the positive electrode, forming a complete current transmission cycle. Oxygen is released on the anode surface during electroplating.



应用场景 APPLICATION SCENARIOS

电镀锌，贵金属电镀（包括镀金、镀银、镀钯等）；电镀硬铬；电镀镍；电镀锡（钢板镀锡）。

Electroplating of zinc, precious metal electroplating (including gold plating, silver plating, palladium plating, etc.); hard chromium electroplating, nickel electroplating; tin electroplating (tinning of steel plates).



蚀刻液回收 ETCHING SOLUTION RECOVERY

在电子线路板（PCB）蚀刻过程中，蚀刻液中的铜含量渐渐增加。蚀刻液要达到最佳的回收效果，每公升蚀刻液需含120至180克铜及相应分量的蚀刻盐（ NH_4Cl ）及氨水（ NH_3 ）。蚀刻液再生循环系统有酸性、碱性，两大系统又可分为萃取法、直接电解法。可将大量原本需要排放的用后蚀刻液还原再生成为可再次使用的再生蚀刻液，降低生产成本的同时，减少生产废液的排放，且可提取出高纯度电解金属铜。

During the etching process of electronic circuitboards (PCB), the copper content in the etching solution gradually increases. To achieve the best recovery effect, each liter of etching solution must contain 120 to 180 grams of copper and the corresponding amount of etching salt (NH_4Cl) and ammonia (NH_3). The etching solution regeneration circulation system is acidic and alkaline, and the two major systems can be divided into extraction method and direct electrolysis method. A large amount of used etching solution that originally needs to be discharged can be restored and regenerated into reusable regenerated etching solution, which reduces production costs, reduces the discharge of production waste liquid, and can extract high-purity electrolytic metallic copper.

溶液类型 SOLUTION TYPE

溶液类型/SOLUTION TYPE	阳极类型/ANODE TYPE
碱性蚀刻液/ALKALINE LIQUID	钛基铱钽/IRIDIUM TANTALUM
酸性蚀刻液/ACIDIC LIQUID	钛基钌铱/RUTHENIUM IRIDIUM

应用场景：PCB行业制作工序中，产生大量蚀刻液（含有不同浓度的硝酸铜、硫酸铜）

电流密度：（200-400）A/m²

使用寿命：12-24个月

Application scenario: PCB industry production process, produce a large number of etching solution (containing different concentrations of copper nitrate, copper sulfate)

Current density: (200-400) A/M²

Service life: 12-24 months



阴极保护 CATHODIC PROTECTION

阴极保护海水应用产品 CATHODIC PROTECTION SEAWATER APPLICATION PRODUCTS

应用领域：海水环境船舶、设备保护
Application：Protection of ships and equipment in seawater environments.



阴极保护阳极带 RIBBON ANODE FOR CATHODIC PROTECTION

产品说明：
热膨胀系数：8.7*10⁻⁵/k
电阻率：0.0000562/cm
热导率：15.6W/(m*k)
涂层体系：钛涂铱（NACETMO108-2008）
常用电流：17mA/M-----50Y
34mA/M-----25Y
42mA/M-----20Y

Thermal expansion coefficient: 8.7*10⁻⁵/k
Resistivity: 0.0000562/cm
Thermal conductivity: 15.6W/(m*k)
Coating system: Titanium coated with iridium (NACE TM088-2008)
Common current: 17mA/M-----50Y
34mA/M-----25Y
42mA/M-----20Y



阴极保护 CATHODIC PROTECTION

阴极保护用阳极管 TUBULAR ANODE FOR CATHODIC PROTECTION

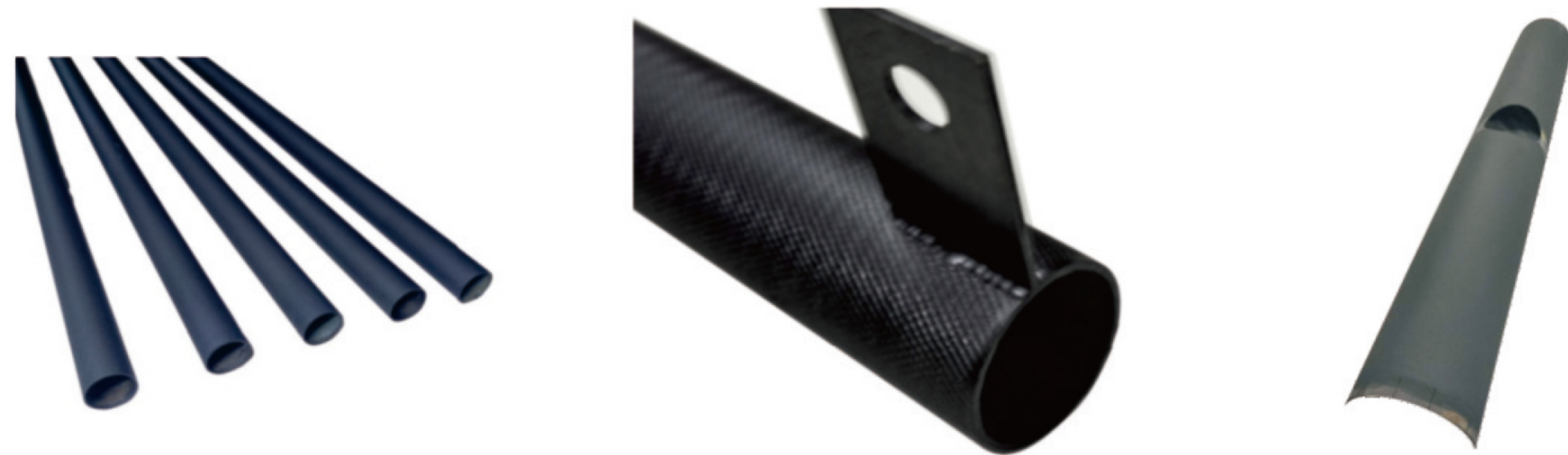
应用领域：码头钢桩、深海平台、小型罐区、区域性阴极保护。
Application fields: steel columns in docks, deep-sea platform, small tank farm, regional cathodic protection.

产品规格及性能 PRODUCT SPECIFICATIONS AND PERFORMANCE

外径/OD(mm)	长度/L(mm)	壁厚/WT(mm)	重量/KG	表面积/SA(㎡)	电流/A(A/m)	寿命/Y
19	1200	1	0.3	0.072	7.2	20
25	500	1.5	0.25	0.039	4	20
25	1000	1	0.34	0.079	8	20
25	1000	1.5	0.5	0.079	8	20
25	1500	1.5	0.75	0.118	12	20
32	1000	2	1	0.121	12	20

涂层类型 COATING TYPE

土壤环境：钛涂铱(NACETMO108-2008)
海水环境：钛涂钌铱(NACETMO108-2008)
Soil environment: Titanium coated with Iridium (NACE TM0108-2008)
Seawater environment: Titanium coated with Ruthenium-Iridium(NACE TM0108-2008)



钉系钛阳极

RUTHENIUM-SERIES TITANIUM ANODE

产品参数

PRODUCT PARAMETERS



基材: Gr1、Gr2
工作电流范围: <7500A/m²
工作温度: <65℃
表面金属: RuO₂+Ir O₂+TiO₂
钉含量: 8-35g/m²
涂层厚度: 2-10 μm
产品形状: 网, 板, 管, 棒等
使用环境: PH值: 0-14

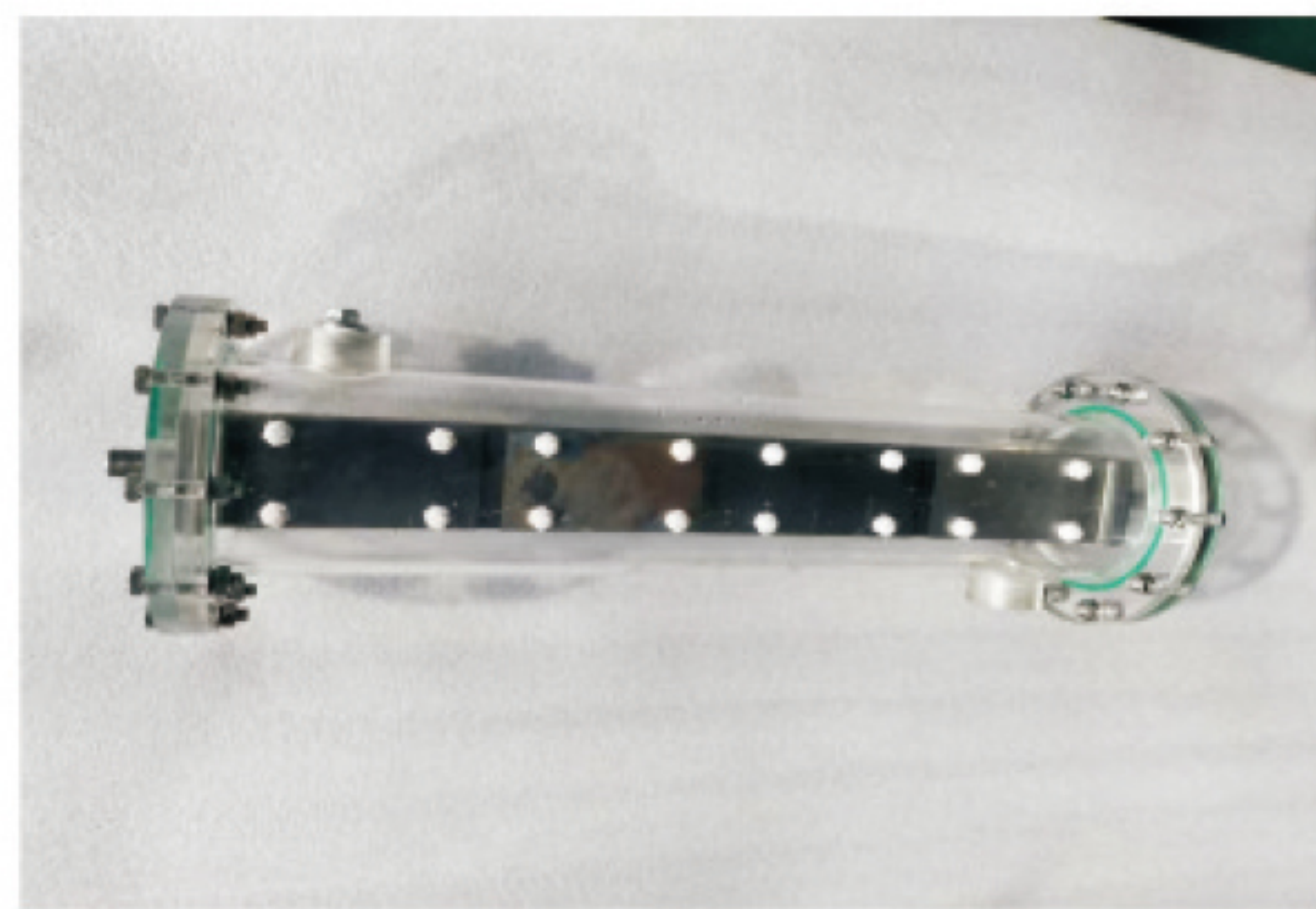
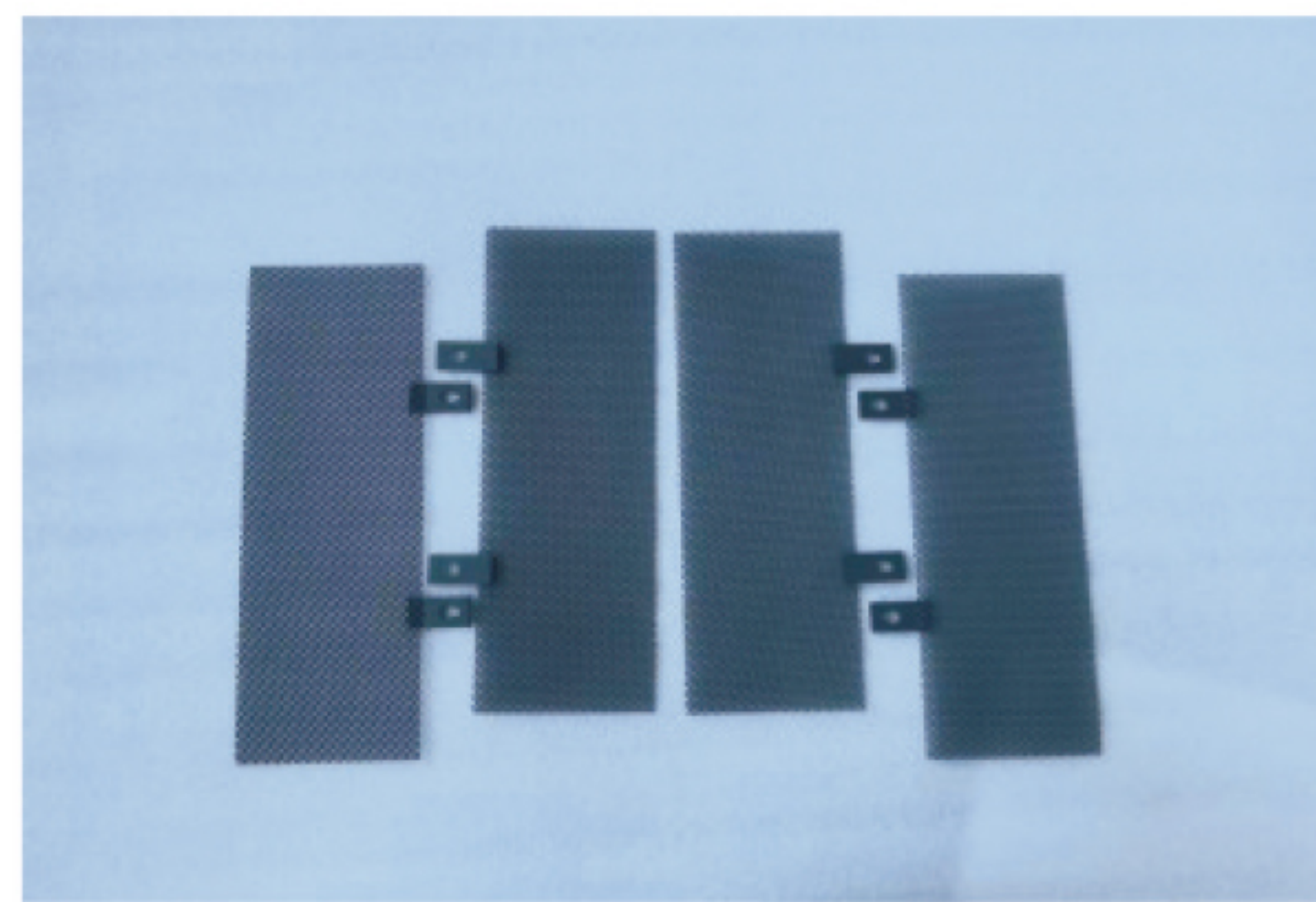
Substrate: Gr1 Gr2
Working current range:<7500A/ m²
Working temperature:<65°
C Surface metal: RuO₂+Ir O₂+Ti O₂
Ruthenium content: 8-35g/ m²
Coating thickness: 2-10 μ m
Product shape: mesh, plate, tube, rod, etc
.Usage environment: PH0-14

应用领域

APPLICATION

氯碱工业、隔膜法制碱、氯酸盐工业、电解制取二氧化氯、酸性水电解、电解海水制氯、电厂循环用水杀菌灭藻、氯化物体系电积金属、离子水电解、电渗析等。

Chlor-alkali industry, chlorate industry, electrolysis of chlorine dioxide, acid hydrolysis, electrolysis of seawater chlorine, water sterilization and algae, electro -volume metal metal. ion hydrolysis, electrolytic diagnosis, etc.



电解次氯酸钠

ELECTROLYTIC SODIUM HYPOCHLORITE

次氯酸钠发生器根据使用用途分为卫生消毒用和环境保护用两大类。我公司目前生产的钛阳极在卫生消毒方面有：游泳池消毒、餐具消毒、卫生食品消毒等与人体健康直接有关的次氯酸钠发生器。在环境保护类方面，主要有医院污水处理、各种工业废水处理用次氯酸钠发生器。

Sodium hypochlorite generator is divided into two categories: sanitary disinfection and environmental protection according to the usage. The titanium anode currently produced by our company is used in hygienic disinfection: swimming pool disinfection, tableware disinfection, hygienic food disinfection, etc. directly related to human health. In terms of environmental protection, there are mainly sewage treatment of hospitals and various industrial wastewater treatment.

常用规格

COMMON SPECIFICATION

TYPE/MODEL	DNE-WL50B	DNE-WL100B	DNE-WL200B	DNE-WL300B	DNE-WL500B	DNE-WL750B	DNE-WL1000B	DNE-WL1500B	DNE-WL2000B
Effective Chlorine Production	50g/h	100g/h	200g/h	300g/h	500g/h	750g/h	1000g/h	1500g/h	2000g/h
Diameter of Flange	135mm	210mm	200mm	210mm	270mm	270mm	270mm	360mm	360mm
Diameter of Housing	100mm	150mm	140mm	150mm	200mm	200mm	200mm	270mm	270mm
Total Length of Electrolyzer	310mm	450mm	450mm	550mm	820mm	820mm	1020mm	980mm	1200mm
Size of inlet and outlet	G1" Internal Thread	G1/2" External Thread	G1/2" External Thread	G1/2" External Thread	G3/4" Internal Thread	G3/4" Internal Thread	G3/4" Internal Thread	G1" Internal Thread	G1" Internal Thread
Current	60A ± 20%	50A ± 20%	84A ± 20%	84A ± 20%	120A ± 20%	150A ± 20%	156A ± 20%	600A ± 20%	600A ± 20%
Voltage	≤ 5V	≤ 15V	≤ 15V	≤ 20V	≤ 30V	≤ 30V	≤ 40V	≤ 35V	≤ 40V
Pressure of Electrolyzer	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa	≤ 0.2Mpa
Material of The Tank	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC	PMMA/PVC
Flow of the Salt water	6L/h-8L/h	12L/h-20L/h	25L/h-35L/h	36L/h-50L/h	65L/h-85L/h	90L/h-130L/h	125L/h-170L/h	185L/h-260L/h	250L/h-400L/h
The solution of inlet	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine	2-5% Brine
The temperature of inlet	5-15℃	5-15℃	5-15℃	5-15℃	5-15℃	5-15℃	5-15℃	5-15℃	5-15℃
Pickling HCL Concentration	15-18% (descaling)	15-18% (descaling)	15-18% (descaling)	15-18% (descaling)	15-18% (descaling)	75-18% (descaling)	15-18% (descaling)	15-18% (descaling)	15-18% (descaling)

应用领域：次氯酸钠发生器、防污处理、压舱水处理、生活污水处理、泳池消毒。

产品规格：阳极组件有管状或板状两种形式（可根据图纸加工）

阳极寿命：大于20000小时

Application : sodium hypochlorite generator, pollution -proof treatment, cockpit water treatment, domestic sewage treatment, swimming pool disinfection.

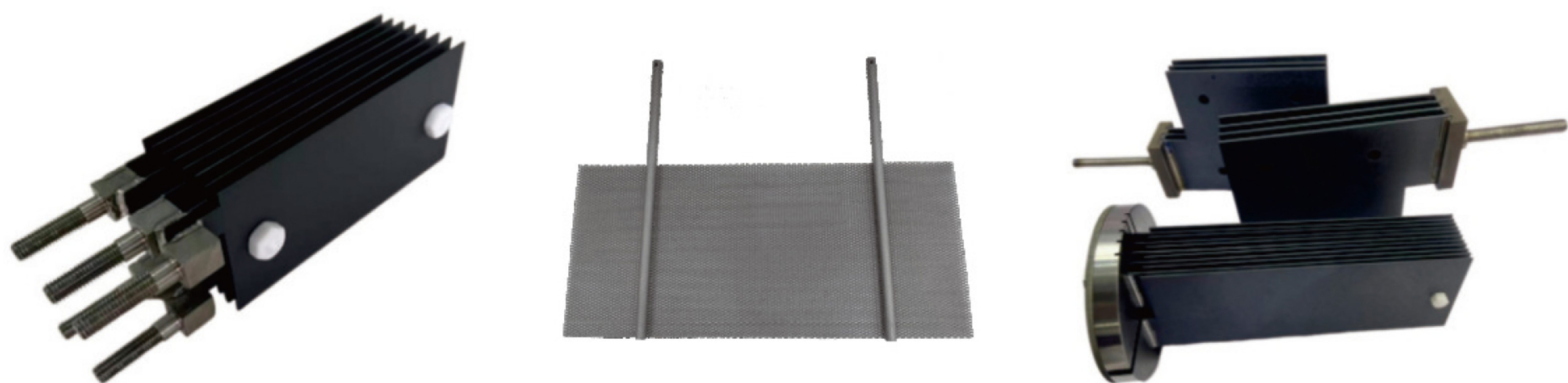
Product specifications: Anode components are available in tubular or plate-shaped forms (machinable according to drawings)

Anode life time: More than 20000 hours

氯碱工业 CHLOR-ALKALI INDUSTRY

以电解食盐水溶液生产烧碱，阳极产出氯气，阴极反应产出氢气和烧碱。我公司涂层电极在氯碱行业使用时，与石墨阳极相比较，具有损耗量小，析氯电位大幅度降低，尺寸形状稳定等优势。且同样的电解环境下能耗低，氯气纯度高。

Caustic soda is produced by electrolyzing salt watersolution. The anode produces chlorine, and thecathode reacts to produce hydrogen and è austic soda.When our company's coated electrodes are used in thechlor-alkali industry, compared with graphite anodes,they have the advantages ofsmall loss, greatlyreduced chlorine evolution potential, and stable sizeand shape, In addition, under the same electrolysisenvironment, the energy consumption is;low and thechlorine purity is high.



产品参数 PRODUCT PARAMETERS

工况条件：饱和 NaCl(35%) 溶液

电流密度：1000A/m²

电解方式：离子膜电解（阳极室和阴极室）

涂层类型：钌铱

使用寿命：5年以上

形状：根据客户的要求而定。产品几何形状

网箱式、单极多元板式阳极组或其它形式

Work conditions: saturatedNaCl(35%) solution

Current density:1000A/m²

Electrolytic method: ion membrane electrolytic
(anode room and cathode room)

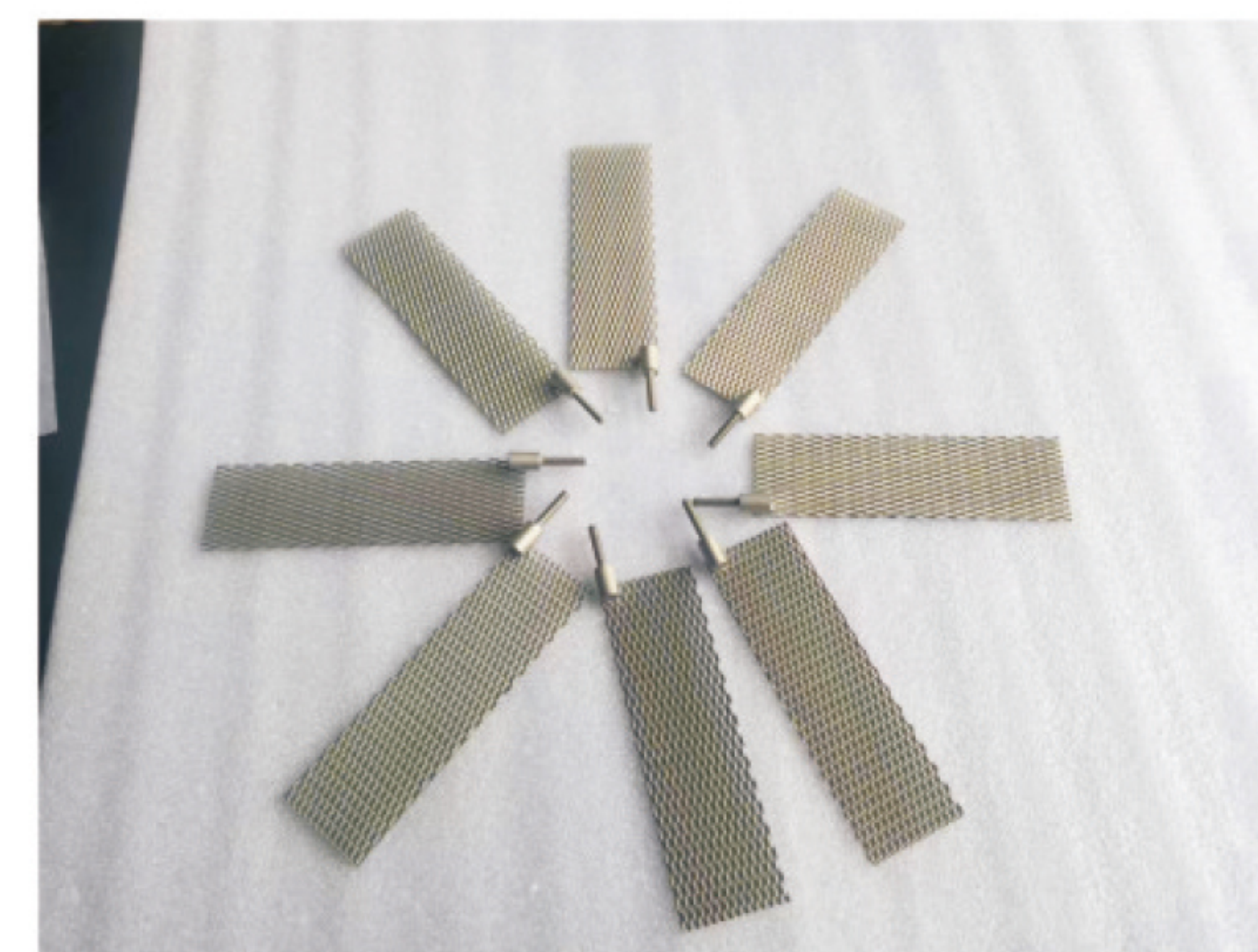
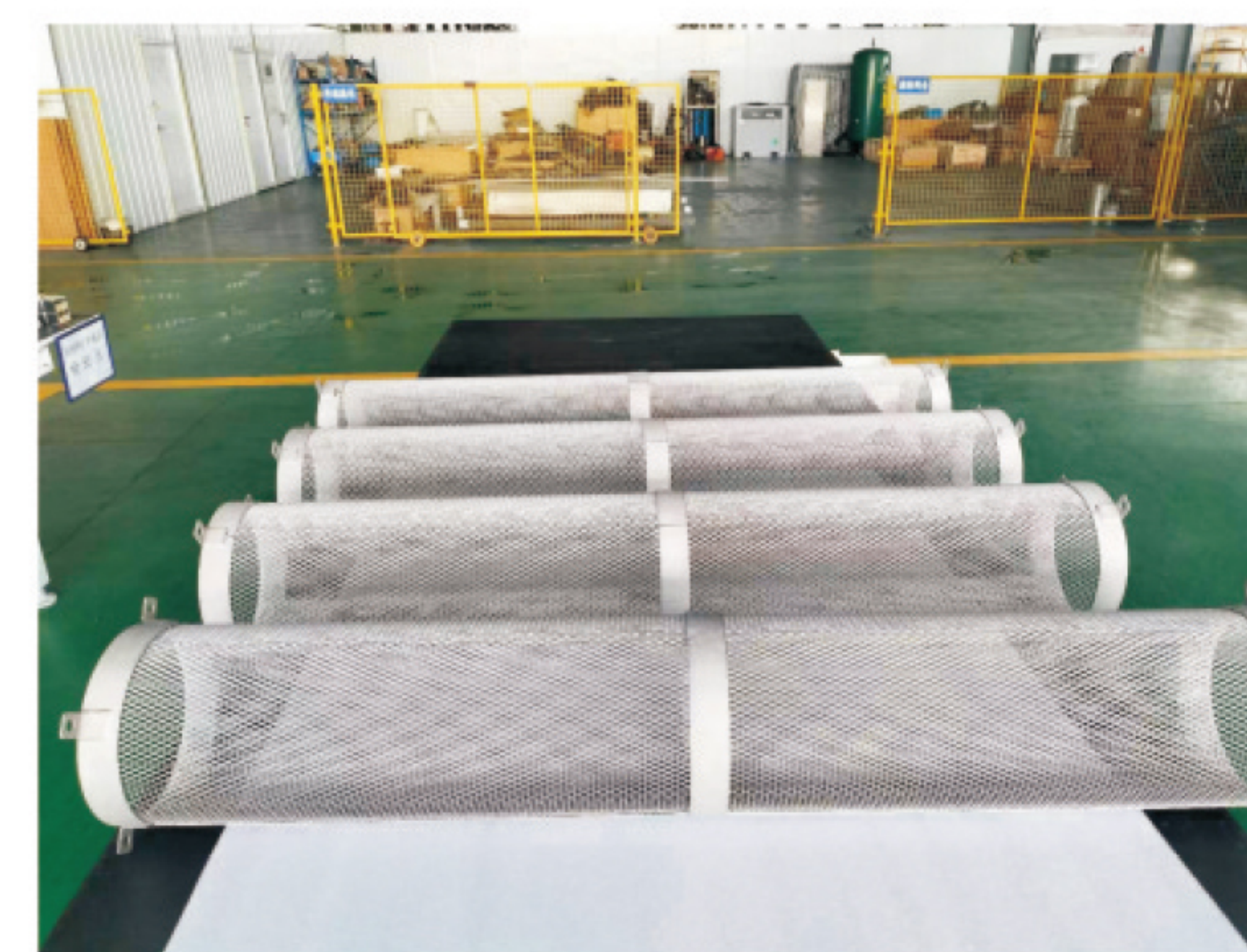
Type ofcoating: Ruthenium-Iridium

Life time: more than 5 years

Shape:Depending on customers requirements.

Product geometric shape cage type, single pole
diverse plate anode group or other forms

铂系钛阳极 PLATINUM SERIES TITANIUM ANODE



产品参数 PRODUCT PARAMETERS

基材：Gr1、Gr2

工作电流范围：<8000A/m²

工作温度：<80℃

表面金属：铂（纯度 99.99%）

铂金含量：> 21.48g/m²

涂层厚度：0.2–15 μm

产品形状：网，板，管，棒等

使用环境：PH值：1–12

Substrate:Gr1 Gr2

Working current range: <8000A/m²

Working temperature:<80℃

CSurface metal: PT(purity 99.99%)

Platinum content: 0.2–15g/ m²

Coating thickness: 2–12 μm

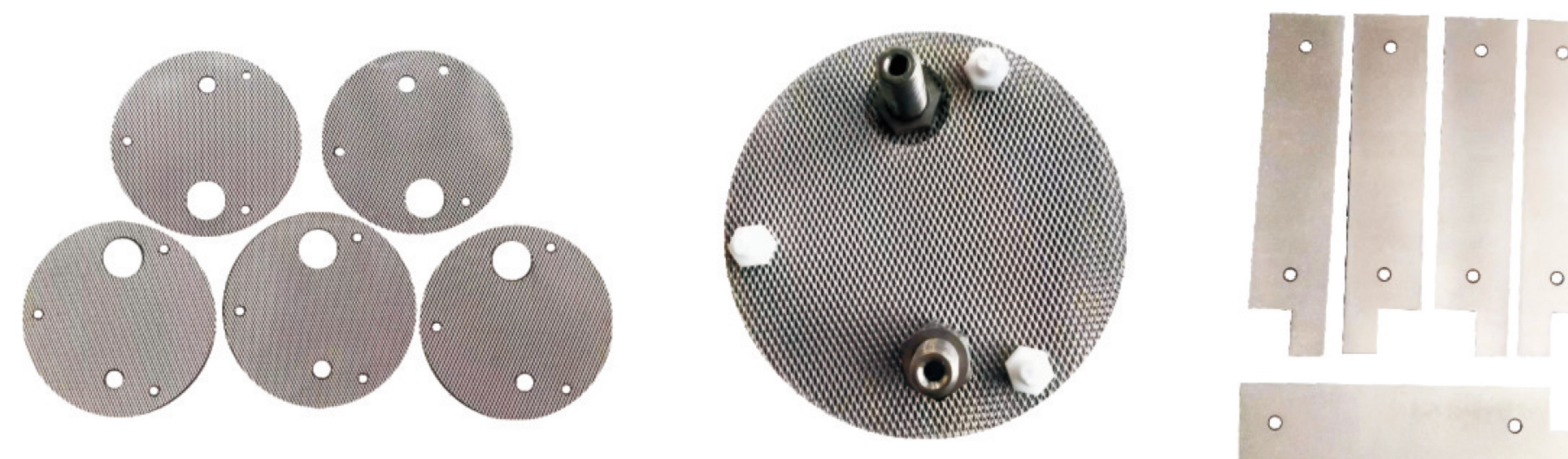
Product shape: mesh, plate, tube, rod, etc

Usage environment: PH 1–12

应用领域 APPLICATION

电解离子水、电镀、制氢机、氧化酸性电位水、HHO发生器等领域。

Electrolytic ionized water, electroplating, hydrogen production machine, oxidizing acid potential water, HHO generator and other fields.etc.



二氧化铅钛阳极 LEAD DIOXIDE TITANIUM ANODE

产品特性 PRODUCT FEATURES

- 1.析氧电位 $\geq 1.70V$ ，具有极强的氧化性。
- 2.电流效率高，在低电流密度下，与铱钽阳极能耗相当。在电流密度大于 $500A/m^2$ 时，能耗比铱钽槽电压高 $0.2V$ 左右。
- 3.具有双镀层立体结构，镀层具有很好的结合力。
- 4.属于不溶性阳极，耐腐蚀。
- 5.阳极镀层损坏后，基体可以重复使用。
- 6.成本低，工作寿命长，性价比高。

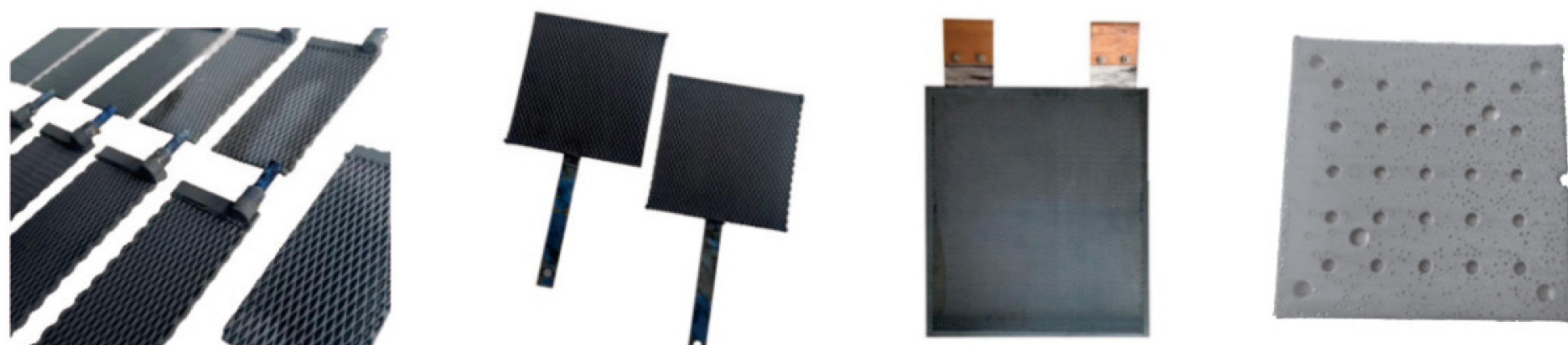


- 1.Oxygen evolution potential $>1.70V$, with extremely strong oxidizing properties.
2. The current efficiency is high. under low current density, it is equivalent to the energy consumption of the Ir-Ta anode. When the current density is more than $500A/m^2$, the energy consumption is about $0.2V$ higher than Ir-Ta tank voltage.
3. It has a double-layer three-dimensional structure, and the coating has a good combination.
4. It belongs to insoluble and corrosion resistance anode.
- 5.After the anode plating is damaged. the substrate can be reused.
6. Low cost, long life time, high cost performance.

应用领域 APPLICATION

电镀、冶炼、生活污水处理、过硫酸盐生产、含酚废水褪色处理、油田废水、印染废水、氨氮废水等领域。

Electroplating, smelting, domestic sewage treatment, persulfate production, bleaching treatment of phenol-containing wastewater, oil field wastewater, printing and dyeing wastewater, ammonia nitrogen wastewater and other fields.



注意事项 PRECAUTIONS

- 钛是阀型金属，导电性差，在盐水中作为阳极不导电，作为阴极导电。涂刷贵金属之后具有导电性、催化活性。
- 钛阳极涂层只有 $2-10$ 微米左右，在生产+运输+应用过程中，要小心呵护，严禁划伤。
- 阳极使用中，安全性最重要，要消除静电、短路状况发生。避免频繁断电，在没有电流通过的情况下，涂层在溶液中长时间浸泡会受到很大损害。
- 停机或其他检修状况时，用稀盐酸或稀硝酸溶液浸泡，然后用清水彻底冲洗，不得用尼龙或机械物质等冲刷。
- 电解液工作时温度不宜过高，理想温度 $25-40^{\circ}C$ ，有条件可加换热装置以保持电极最佳使用环境。电解液中禁止含有氟离子，氰基离子和硫离子，如有则对阳极的寿命影响也比较大。
- 在生产使用当中保持阳极洁净，不能沾染油污或其他附着物以免影响电解效果和电极寿命。
- Titanium is a valve-type metal with poor electrical conductivity. When used in salt water, it is non-conductive as an anode and conductive as a cathode. After being coated with precious metals, it has electrical conductivity and catalytic activity.
- The coating thickness of titanium anode is only about $2-10\mu m$. During the production+transportation+application, it must be carefully protected to avoid damage.
- Safety is most important in the use of anode, to eliminate static electricity, short-circuit conditions occur. Avoid frequent power cuts, in the absence of current passage, the coating will be greatly damaged if it is immersed in solution for a long time.
- Shutdown or other maintenance conditions, with dilute hydrochloric acid or dilute nitric acid solution soak, and then rinse thoroughly with water, not with nylon or mechanical substances such as flushing.
- The working temperature of electrolyte should not be too high, the ideal temperature is $25-40^{\circ}C$, and a heat exchanger can be added to maintain the best environment for electrode use. The electrolyte should not contain fluorine ions, cyanide ions and sulphur ions, if there are any, the life of the anode will be greatly affected.
- Keep the anode clean in the production and use, not stained with oil or other adherents so as not to affect the electrolysis effect and the life of the electrode.