آکو فناوری برین مواد

تامین کننده پودر و انواع قطعات سرامیکی

مشاوره برای انتخاب بهتر

دکترمرتضی هادی ۰۹۱۲۶۲۶۵۱۳۶

烧结设备
Sintering equipment

真空碳管炉 Vacuum carbon tube furnace

气压炉 Pressure Furnace

氮气炉 Nitrogen Furnace

高温炉 High Temperature Furnace

箱式升降炉 Lift Furnace

精密加工设备
Precision machining equipment

外圆磨 Cylindrical grinder

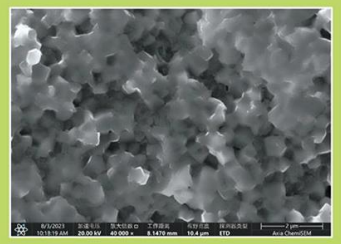
阿奇夏米尔慢走丝 Agie Charmilles Wire-Cut EDM Machine

光学曲线磨 Profile Grinding Machine

五轴精雕机 Five axis CNC Machine

CNC磨床 CNC Grinding Machin

氧化锆（ZrO_2）——韧性最好的陶瓷材料



氧化锆不仅具有高硬度，高耐磨性，也是精细陶瓷中韧性非常好的材料，因此它常用于结构件，耐磨件。它还具有与钢材接近的热膨胀系数，因此也是常用于连接陶瓷和钢的材料，氧化锆除了常用在工业结构件领域，因其具有玉石般的质感，在生活陶瓷中也有着广泛的应用。

Zirconia not only has high hardness and wear resistance, but also is a material with excellent toughness in fine ceramics, so it is commonly used for structural parts and wear parts. As thermal expansion coefficient is close to the steel, it is also always used to connect ceramic and steel.

Except commonly used in the field of industrial structural parts, Zirconia is also widely used in daily-used ceramic because of its jade-like texture.

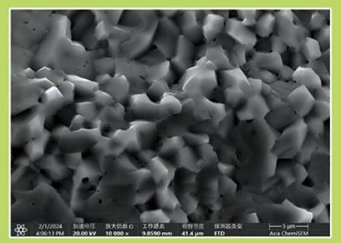
应用领域：

◆光通信用部品（插芯、套管）
◆柱塞 （阀芯、阀套、灌装泵）
◆手机部件（指纹识别、后盖）
◆智能穿戴（表壳，饰品）
◆特种结构件 ◆燃料电池 ◆汽车氧传感器

Application areas：

◆ Optical communication parts（ceramic core pin、ceramic tube）
◆ Medical plunger（valve core，valve sleeve、Filling pump）
◆ Mobile phone parts（Fingerprint recognition、Back cover）
◆ Smart wear（watch case、accessories）
◆ Special structural parts ◆ Fuel Cell ◆ Automotive oxygen sensor

氧化铝（Al_2O_3）——价格与价值最优的材料



氧化铝具有硬度高，熔点高、耐腐蚀、电阻率高、成本低、适中的表面活性、良好的附着力、耐热震性以及屏蔽效应。较厚的多用于磨料或抛光行业。片状氧化铝用于陶瓷增强材料，化妆品，高级涂料等领域。

Alumina has high hardness, high melting point, corrosion resistance, high resistivity, low cost, moderate surface activity, good adhesion, thermal shock resistance and shielding effect. Thicker ones are mostly used in abrasive or polishing industry. Flake alumina is used in ceramic reinforcing materials, cosmetics, advanced coatings and other fields.

应用领域：

◆冶炼 （坩埚、理化器皿）
◆电子行业（电路基板、管座、外壳）
◆机械行业（轴承）

Application areas：

◆ Smelting（Crucible、Physicochemical containers）
◆ Electronics industry（circuit board、tube-socket、outer casing）
◆ Machinery Industry（bearing）

氮化硅（Si_3N_4）——综合性能优异陶瓷材料

它的微观结构由互锁成微棒的细长晶体组成，其互相结合成微棒。优异的耐磨性能，优异的断裂韧性以及非常高的热稳定性，使得氮化硅陶瓷用于轻、高速和高精度的轴承，以及重型陶瓷成形工具和汽车部件承受高应力的滚珠和滚动元件，并且在焊接工艺中利用良好的耐热冲击性和耐高温性。

The microstructure consists of elongated crystals that interlock into micro-rods. Silicon nitride ceramics has excellent wear resistance, outstanding fracture toughness and good thermal stability. It's these features that make it suitable for applications as following: Light bearings high-speed bearings, high precision bearings, tools for heavy-type ceramic forming, automotive components subject to high stress. And the good thermal shock resistance and high temperature resistance is exploited in welding processes.

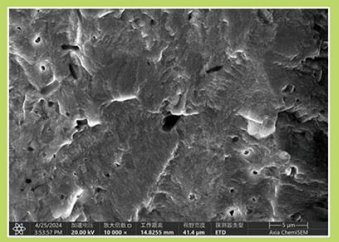
应用领域：

◆机械行业（电机轴承、电主轴）
◆冶金行业（焊接辊、阻水圈）
◆汽车部件（涡轮转子、凸轮挺杆）
◆工业耐磨件（金属成型、剪切刀具，喷砂喷嘴）
◆航天、航空　　◆半导体

Application areas :

◆ Machinery Industry（Electric machinery bearing、Electric Spindle）
◆ Metallurgical industry（welding roller、Water-Resistant Ring）
◆ Auto parts（Turbine rotor、Cam tappet）
◆ Industrial wear parts（Metal forming、cutting tools、sand blasting nozzle）
◆ Aerospace　◆ Semiconductor

镁锆（MG-PSZ）——抗弯强度最佳材料



镁锆陶瓷通过氧化镁作为稳定剂而制备的氧化锆增韧陶瓷，可拥有抗弯强度和断裂韧性最佳的镁锆陶瓷。具有更好的抗热震性。广泛应用于冶金、钢铁和石化工业。而高品质的镁稳定氧化锆陶瓷，更适用于食品工业，医药工业，高精密罐装工业，高精密仪器。

Magnesium zirconium ceramics are zirconia toughened ceramics make by using magnesia as a stabilizer, which can have magnesium zirconium ceramics with the best flexural strength and fracture toughness, with have better thermal shock resistance. It is widely used in metallurgy, steel and petrochemical industries. The high-quality magnesium stabilized zirconia ceramics are more suitable for the food industry, pharmaceutical industry, high-precision canning industry, high-precision instruments.

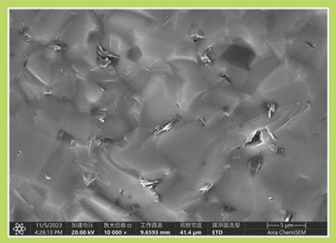
应用领域：

◆冶金　◆石化　◆纺织
◆密封　◆食品　◆医药
◆高精密罐装　◆高精密仪器等等

Application areas :

◆ Metallurgy　◆ Petrochemical　◆ Textile
◆ sealing　◆ Food　◆ Medicine
◆ High-precision canning　◆ High-precision instruments

碳化硅（SiC）——超硬的陶瓷材料



碳化硅几乎像钻石一样。 它不仅是最轻的，也是最硬的陶瓷材料，具有优异的导热性，低热膨胀性，非常耐酸和碱，并且在急冷急热的环境下不易崩裂。

Silicon carbide behaves almost like a diamond. It is not only the lightest, but also the hardest ceramic material and has excellent thermal conductivity, low thermal expansion, high resistant to acids and alkalis and it's not crack easily in the environment of sudden cold or hot.

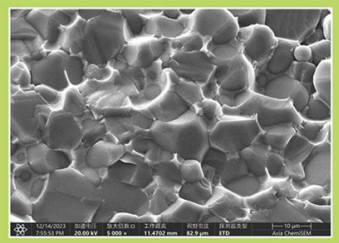
应用领域：

◆石油（阀门、喷嘴）　◆化工（密封件）
◆机械行业（轴承、滚珠）
◆航天（燃汽涡轮机叶片，涡轮增压器转子）

Application areas :

◆ Oil（valves, nozzles）　◆ Chemical industry（sealing parts）
◆ Machinery Industry（ball bearing）
◆ Aerospace （Gas turbine blades、Turbocharger rotor）

氮化铝（AIN）——导热性最佳材料



在先进陶瓷里，氮化铝 (AIN) 拥有高导热性和卓越的电绝缘性、低介电常数与介电损耗，以及优异的抗等离子体侵蚀和无毒等特点而闻名。特别是在高温下也具有优异的抗弯性能。此外，氮化铝陶瓷还具有不受铝液和其它熔融金属及砷化镓侵蚀的特性，特别是对熔融铝液具有极好的耐侵蚀性。

In advanced ceramics, Aluminum Nitride (AIN) is renowned for its high thermal conductivity, excellent electrical Insulation, low dielectric constant and loss, as well as excellent resistance to plasma erosion and non-toxic properties. Especially at high temperatures, it also has excellent bending resistance. In addition, Aluminum Nitride ceramics also have the characteristic of being resistant to corrasion by molten aluminum, other molten metals, and gallium arsenide, especially with excellent corrosion resistance to molten aluminum.

应用领域：

◆散热器　◆半导体制造　◆硅晶片处理和加工
◆电子封装基板　◆熔融金属夹具
◆微电子器件的基板　◆微波器件封装

Application areas :

◆ Heat sink　◆ Semiconductor manufacturing
◆ Mechanical industry (Bearings, Balls)　◆ Silicon wafer processing
◆ Electronic packaging substrate　◆ Molten metal fixture
◆ Aerospace (gas turbine blades, turbocharger rotors)
◆ Substrates for microelectronic devices　◆ Microwave device packaging

陶瓷泵阀柱塞
Ceramic Pump and Valve Plunger

★增韧结构陶瓷材料制造,机械强度高,使用寿命长
★具备耐磨损、耐腐蚀、抗高温及化学稳定性稳定等卓越性能。
★具有隔热性好、热膨胀小
★产品尺寸精度高,圆度0.001mm、密封性能好
★绿色环保无污染

★Made of toughened structural ceramic materials, high mechanical strength, long service life
★With wear resistance, corrosion resistance, high temperature stability , chemical stability and other superior performance
★With good thermal insulation, thermal expansion
★High precision dimension, roundness reachs 0.001mm, good sealing performance
★Green pollution-free

陶瓷轧辊/对辊/三辊
Ceramic Roller/Ceramic Dual-roll/Ceramic Three-roll

★材料具有高硬度,高耐磨性,以及不导磁不导电。
★具有非常高的热稳定性,在高温工作情况下也能保持其性能。
★高精密度,R精度可达±0.002mm。
★跳动度、圆度精度可达±0.002mm。
★绿色环保,在成型工作中可节省30%以上的能源

★Material has high hardness, high wear resistance, non-magnetic and non-conductive.
★Exceptional thermal stability and maintains its performance even under high-temperature working conditions.
★Degree of accuracy, the precision of R, Vibration, roundness accuracy up to + 0.002 mm
★Achieves excellent runout and roundness accuracy within ±0.002mm.
★Environmentally friendly, saving more than 30% energy during the forming process.

精密陶瓷零件
Precision Ceramic Parts

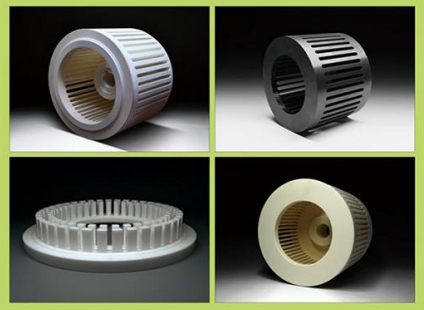
★可做异形精细加工,加工范围可达250mmx200mmx200mm
★公差达到±0.002mm
★精密度达±0.001mm
★光洁度Ra0.08

★Can do special shaped fine processing, range can be up to 250mm X 200mm X 200mm
★The precision can reach ±0.002 mm
★Degree of accuracy can be ±0.001 mm
★Surface Finish can reach Ra 0.08

粉体设备配件
Powder Equipment Accessories

★耐高温、耐酸碱腐蚀
★硬度高，耐磨性好
★化学稳定性佳，不易与材料发生反应
★产品尺寸精度高
★绿色环保无污染

★ High temperature resistance, acid and alkali corrosion resistance
★ High hardness and good wear resistance
★ Good chemical stability, less likely to react with materials
★ High dimensional accuracy of the product
★ Green, environmentally friendly, and pollution-free



半导体设备配件
Semiconductor Equipment Parts

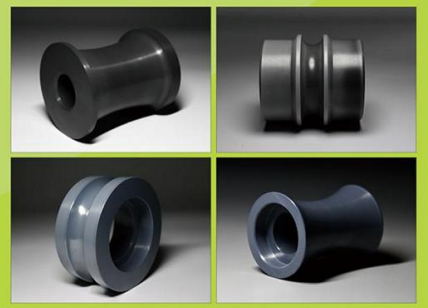
★具有优异的耐磨、耐高温、耐腐蚀、抗热冲击、绝缘等特性
★相比传统材料性价比优越。
★拥有其他材料无法达到的强度和破坏韧性，适用于高腐蚀性，高强度环境
★绿色环保

★Excellent wear resistance, high temperature resistance, corrosion resistance, thermal shock resistance, insulation and other characteristics
★Good price compared with traditional materials,
★Having strength and fracture toughness that other materials cannot achieve, suitable for highly corrosive and high-strength environments.
★Green and environmentally friendly

焊接辊
Welding Roller

★产品材料具有高硬度，高耐温性，且热震稳定性佳
★抗弯、抗压强度高
★曲面轮廓度达0.01
★光洁度可达Ra0.02

★Material has high hardness, high temperature resistance, and excellent thermal shock stability
★High bending and compressive strength
★Surface profile accuracy reaches 0.01
★Smooth finish up to Ra0.02



硬质合金（钨钢）
Hardmetal (Tungsten Carbide)

钨钢，又称为硬质合金，是指至少含有一种金属碳化物组成的烧结复合材料。碳化物组份（或相）的晶粒尺寸通常在0.2-10微米之间，碳化物晶粒使用金属粘结剂结合在一起。粘结剂通常是指金属钴（Co）,但对一些特别的用途，镍（Ni），铁（Fe）或其它金属及合金也可使用。

Tungsten Carbide, also known as cemented carbide, refers to a sintered composite composed of at least one metal carbide. Crystal size of carbide component (or phase) Typically between 0.2 and 10 microns, the carbide crystals are bonded together using a metal binder. The binder usualy refers to cobalt metal (Co), but for some special Other uses, nickel (Ni),iron (Fe), or other metals and alloys can also be used.

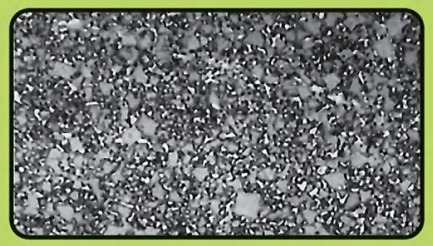
钨钢(硬质合金)具有硬度高、耐磨、强度和韧性较好、耐热、耐腐蚀等一系列优良性能，特别是它的高硬度和耐磨性，即使在500°C的温度下也基本保持不变，在800°C时仍有很高的硬度。

Tungsten Carbide has a series of excellent properties such as high hardness, wear resistance, strength and toughness,heat resistance and corrosion resistance, especially its high hardness. And wear resistance, aven at 500° C, remains essentially unchanged, still with high hardness at 800°C.

近年来，夏阳在已有耐磨系列、耐磨耐腐蚀系列、耐高温系列、超细颗粒系列的基础上，陆续开发不导磁系列。电火花慢走丝系列、先进陶瓷系列的新材料。

Based on the existing wear-resistant series, wear-resistant and corrosion-resistant series, high-temperature resistant series and vultra-fine particle series. XY has successively developednew materials for non-magnetic series, EDM slow wire series and advanced ceramic series in recent years.

不导磁钨钢 Non-magnetic tungsten carbide

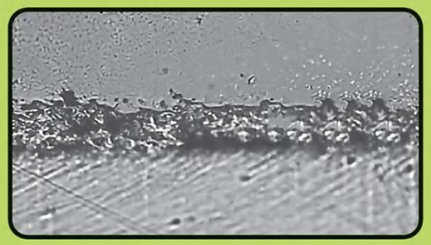


这种材料常应用于高频焊接精密仪表零件 。夏阳公司为了满足特定客户的需求，新研发W系列钨钢，硬度在HRA85-91不等，其关键性能指标接近国外同行水平，可以满足这些客户不同用途。

Non-magnetic tungsten Carbide is commonly used for high-frequency welding of precision instrument parts. In order to meet the specific needs of customers, XY Company has newly developed the W series tungsten steel, with hardness ranging from HRA85-91, and its key performance indicators are close to the level of foreign peers, which can meet the different purposes of these customers.

电火花慢走丝专用钨钢 Special Tungsten Carbide for EDM and Slow-Speed wire

在钨钢加工过程中，通常使用电火花、慢走丝等电加工设备。电火花加工过程中瞬间产生温度高达8000°C，使钨钢中结合剂气化，加工表面形成凹凸不平的坑，在使用过程中寿命大大降低。夏阳公司加入特殊元素和特别工艺的钨钢，经过反复测试终于解决了这个问题，使得电火花、慢走丝加工过程中，结合剂气化熔出大幅减少。从而提高了使用寿命，比一般钨钢高50%以上，完全可以替代进口的同类产品。



It usually uses EDM, Slow-speed wire cut machine and other electric processing equipment during the processing of the tungsten carbide. The instantaneous generation of temperatures up to 8000°C vaporizes the bonding agent in the tungsten carbide during the EDM process and makes the surface easy to form uneven pits, and greatly reducing its service life. XY adds special elements and special process of tungsten carbide. atter repeated trials, it finally solves the problem, the gasification and melting of the binder is greatly reduced during the EDM and slow-Speed wire cut processing, it is more than 50% higher than ordinary tungsten carbide and completely replace imported similar parts.

钨钢零件
Tungsten Carbide Parts

主要产品 (MainProducts)

*钨钢衬套	Bushing
*钨钢冲头/冲针	Punch/Pin
*钨钢圆棒	Cylinder
*钨钢喷嘴	Nozzles
*钨钢热熔钻	Flow Drill
*钨钢针阀	Needle Valve
*钨钢阀芯阀套	Tungsten steel valve sleeve
*钨钢模具	Tungsten Carbide Molds & Dies

钨钢具有耐磨损、耐腐蚀、耐高温等优良性能，正越来越多应用于不同工业领域。具体讲，钨钢有以下特点： Tungsten carbide has excellent properties such as abrasion resistance, corrosion resistance and hightemperature resistance, and is increasingly used in various industrial fields. Specifically, there are some advantages as follow for tungsten carbide:

*钨钢模具寿命长，是普通钢料的50倍以上	Tungsten carbide molds & dies has a long service life, whnich is more than 50 times that of ordinary steel
*尺寸精度高，品质有保障	High dimensional accuracy and quality assurance
*良好的表面光洁度，产品性能好	Excellent surface finish and product performance
*综合性价比高	High comprehensive cost performance

钨钢轧辊
Tungsten carbide Roll

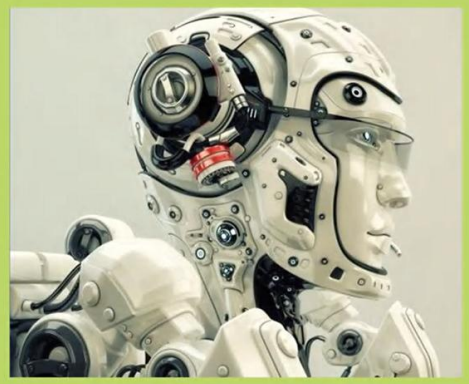
规格 Specification	Φ106*320
用途 Application	光伏焊带、FFC制线专用 Professional used in PV ribbon and pressing metal wire for FFC
特点 Features	精度高，跳动度、圆度≤0.001mm High precision,Runout and Roundness≤0.001mm 硬度高，光洁度好，维护方便 High hardness and high glass finishing，Easy maintenance 寿命是SKD11的50倍以上 Lifetime is 50 times longer than SKD11

夏阳轧辊在市场上拥有良好业绩，市场占有率大，长期与日本及韩国设备和国内一流压延设备做配套使用，深受设备商和终端客户的信赖和喜爱！

XY Carbide Roller has create a great sales performance in the market, the rollers are long-term used with advanced equipment from Japan, Korea and China,and deeply trust and support by most of equipment suppliers and clients.

不导磁钨钢零件
Non-magnetic tungsten carbide parts

规格 Specification	按客户图纸定制 Customized according to customer drawings
特点 Features	多种硬度不同的非磁性材料可供选择，也可以是普通钢+非磁性钨钢的组合 A variety of different hardness non-magnetic materials to choose from, can also be a combination of ordinary steel+ non-magnetic tungsten steel 高精密、寿命长，是普通无磁钢10倍以上 High Precision、Long life, more than 10 times that of ordinary non-magnetic steel



精密仪器
Precision Equipments

行业性能要求：
耐高温、耐酸碱腐蚀、高抗压、拥有良好的电绝缘性、导热性、抗热震性，以及优异附着强度、热循环能力。

产品：
光伏轧辊、热流道喷嘴、导柱导套、汽车拉伸模具
金属冶金隔热导热材料管、柱塞高压泵

Industry performance requirements:
high temperature, acid and alkali corrosion resistance, high pressure resistance, and good electrical insulation, thermal conductivity, thermal shock resistance, and excellent Adhesion strength, thermal cycling capacity.
Products:
PV roller, Hot runner nozzle, guide column guide sleeve, automobile tensile die metallurgical thermal insulation material tube, plunger high pressure pump

航空航天
Aerospace

陶瓷热膨胀系数低于常用金属,优良的电气隔离、介电特性；导热性佳，耐磨性、机械强度高，在高频下的低损耗老化慢。抗EUV等离子体和离子辐射，以及在高真空中几乎不放气。

应用：
EUV半导体设备的传感器。

The coefficient of thermal expansion of ceramics is lower than that of common metals, excellent electrical isolation and dielectric properties; good thermal conductivity, high wear resistance, high mechanical strength, and lower loss at high frequencies.
Anti-EUV plasma and ionizing radiation, and almost no deflation in high vacuum.Application: Sensors for EUV semiconductor devices.

化妆品/医疗/食品
Cosmetic /Medical/ Food

特种陶瓷具有超强化学稳定性，良好的耐磨性、耐高温、耐腐蚀、极强的耐酸碱性、机械性能好和密封性能佳,自润滑使灰尘不易粘附,清洁更为容易。

产品种类：
陶瓷缸筒柱塞、陶瓷流量阀、陶瓷泵芯柱塞定量泵、陶瓷活塞等；

Special ceramics have super strong chemical stability, good wear resistance, High Temperature、corrosion resistance, strong acid alkaline resistance, good mechanical properties and sealing performance is good, self-lubricating makes dust not easy to adhere to, and cleaning is easier.
Products:
Ceramic cylinder plunger, ceramic flow valve, ceramic pump core 、Plunger metering pump, ceramic pistons, etc..

封装电子
Electronic Package

传统电池组在高温中使用腐蚀性强的电解质，为使电池能在1000°的高温工作，要求稳定的薄状电解质。陶瓷即使在1000°也是稳定的，可以避免电池结构材料的腐蚀和电解质的逸散。

应用种类：
电容器、热敏电阻、光电器件、陶瓷基板电解质、变阻器、传感器、陶瓷金属印刷头

Conventional battery packs use a highly corrosive electrolyte at high temper-atures, and a stable thin electrolyte is required to operate the battery at a high temperature of 1000 °. The ceramic is stable even at 1000°, and corrosion of the battery structural material and escape of the electrolyte can be avoided.
Applications:
Capacitors, Thermistors, Optoelectronic devices, Ceramic substrate electrolyte, Rheostat, Sensor, Ceramic metal print head

环保新能源
New Energy

特种陶瓷凭借其高强度、耐高温、耐腐蚀等特性，在环保新能源领域展现出显著的技术优势与市场潜力，应用场景持续拓展至多个细分领域，主要体现在新能源技术增效方向。

产品：
隔膜切刀、陶瓷转子、加热器、粉体处理泵

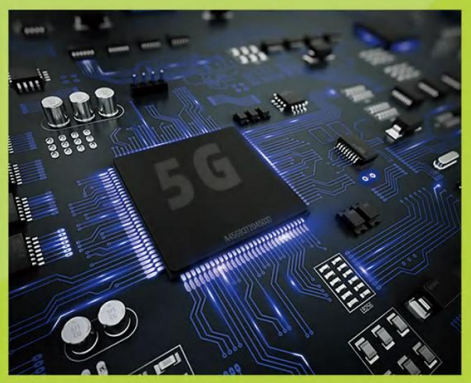
Special ceramics, with their high strength, high temperature resistance, corrosion resistance and other characteristics, have demonstrated significant technological advantages and market potential in the field of environmental protection and new energy. Their application scenarios continue to expand into multiple sub sectors, mainly reflected in the direction of increasing efficiency in new energy technology.
Products:
Diaphragm cutter, Ceramic rotor, Heater, Powder processing pump

半导体
Semiconductor

特种陶瓷是微细晶体的烧结体.它与单晶材料不同.是由晶粒及晶界构成的.正是由于陶瓷内部晶界的存在和利用,使得陶瓷半导体具有一些优于单晶半导体的性能，因此被广泛应用在电子科技领域！

应用：
集成电子、消费电子、芯片、通讯系统、照明

Special ceramics are sintered bodies of fine crystals. It is different from single crystal materials.It is composed of grains and grain boundaries. It is precisely due to the existence and benefits of grain boundaries inside ceramics. so that ceramic semiconductors have some better performance than single crystal semiconductors, So it is widely used in the field of electronic technology!
Application:
Integrated electronics, consumer electronics, chips, communication systems, lighting.



夏阳先进陶瓷材料性能表

XY Ceramic Property

Type(类型)	Unit 单位	Alumina (氧化铝)				Zirconia (氧化锆)					SiliconCarbide (碳化硅)	SiliconNitride (氮化硅)			Aluminum nitride (氮化铝)
XY Grade(编号)	\	A-100	A-200	A-300	AZ-100	Z-100	Z-200	Z-300	ZM-100	ZB-100	SC-200	SN-200	SN-300	SN-1000	ALN
Material(材料)	\	(Al2O3) 97%	(Al2O3) 99.5%	(Al2O3) 99.7%	(Al2O3)-ZrO2	ZrO2-Y203	ZrO2-Y203	ZrO2-Y203	ZrO2-MgO	ZrO2-Y203	(SiC)	(Si_3N_4)	(Si_3N_4)	(Si_3N_4)	AlN
colour(颜色)	\	White. ivory	White	Ivory, White	White	White	White	White	Yellow	Blue	Black	Gray, Black	Gray, Black	Yellow	White , gray
Density(密度)	g/cm^3	3.75	3.9	3.92	4.25	6	6.03	6.04	5.62	6.03	3.14	3.2	3.2	3.2	3.3
Flexural Strength (抗弯强度)	Mpa	280	320	370	600	700	850	1000	600	1000	400	680	850	750	320
Compressive Strength (抗压强度)	Mpa	2250	2300	2450	2700	2100	2200	2300	1600	2300	2000	3000	3000	3000	/
Modules of Elasticity(young) (弹性模量)	Gpa	330	370	380	350	200	210	220	210	220	430	290	300	300	220
Fracture Toughness (断裂韧性)	$MPam^{\frac{1}{2}}$	3	4	4.5	5.5	7	7.5	7.5	5.5	7	3	6	7	7.5	/
Poi sion's Ratio (维泊尔系数)	\	0.23	0.22	0.22	0.24	0.3	0.3	0.3	0.3	0.3	0.16	0.28	0.28	0.28	/
Hardness HRA	HRA	88	89	89.5	91	89	90	90	88	90	93	91.5	92	92	/
Vickers Hardness (维氏硬度)	HV1	1300	1400	1450	1600	1250	1450	1450	1100	1450	2100	1500	1600	1650	1200
Thermal Expansion Coefficient (热膨胀系数)	$10^{-6}K^{-1}$	7.5	8	8	9.2	11	10	10	10	10	4.5	3.2	3.2	3.2	4.5
ThermalConductivity (导热系数)	W/mk	20	28	32	8	3	3	3	3	3	130	26	40	70	180
Thermal ShockResistance (热震稳定性)	△T.°C	200	220	220	470	400	400	400	\	400	400	600	800	800	/
Maximum UseTemperature (最高使用温度) inOxidizingAtmosphere	°C	1200	1400	1600	1000	1000	1000	1000	850	1000	1200	1000	1300	1300	1300
Max Use Temperature (最高使用温度) in Reducing or Inert Atmosphere	°C	1200	1400	1600	1000	1000	1000	1000	850	1000	1600	1200	1400	1400	2200
Vol une Resistivity at 20°C (20°C体积电阻)	Ωcm	10^{14}	10^{15}	10^{15}	10^{14}	10^{13}	10^{12}	10^{12}	$5X10^{13}$	10^{12}	10^{5}	10^{14}	10^{14}	10^{14}	10^{14}
Dielectric Strength (介电强度)	kV/mm	16	20	22	16.5	19	15	17	19	17	0	10	12	16	14
Dielectric Constant (1MHZ)(介电常数)	\	10	10	10	14	28	30	30	27	30	\	12	11	10	8
Dielectric LossAngle at 20°C, 1MHz20°C, 兆赫介质损耗角	tan δ	$3x10^{-4}$	$1x10^{-3}$	$1x10^{-3}$	$2x10^{-2}$ (9GHz)	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$ (1GHz)	$2x10^{-3}$	\	$4x10^{-3}$ (1GHz)	$5x10^{-3}$ (1GHz)	$3x10^{-3}$ (1GHz)	$1x10^{-4}$

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钨钢性能表

Tungsten Carbide Performance Table.

品种分类 Sorts	材质 Grade	HIP	CIP	颗粒 Grain	Co (%)	比重 Density g/cm^3	硬度 Hardness		抗弯强度 T.R.S	用途 Applications
							HRA	HV	N/mm^2	
耐磨系列 Wear-resistant	M10	•		超细 Superfine	6.0	14.80	94	1900	3800	常用粉末冶金模具，也可用于刀片、密封环 Often used for powder metallury dies,and blade,chip. sealed ring and gasket ring.
	M20	•	•	中 Medium	6.5	14.88	91	1550	3100	
	M30	•	•	中 Medium	8.0	14.62	89.5	1400	3200	硬度高，很好耐磨性，通用抽拉模具 High hardness,wear-resistant,used widely in common drawing dies.
	M33	•	•	超细 Fine	8.0	14.60	92	1700	3800	常用于较硬材料的拉深模 Used widely in drawing dies which is for high rigidity mat'l
耐磨 耐冲击系列 Wear& impact-resistant serices	C10	•		中 Medium	10	14.30	89	1200	3430	韧性、硬度极佳，是常用冲头、衬套、入子、镶件较好材料，也是成形模具、卷圆模、轧形模、应力较大拉深模不错材料选择 Tonghness and hardness are good,widely used in punches,bushes.-cavity inserts,core inserts.You also can choose this material for forming dies,curling circle dies,roll shape dies,bid stress drawing dies.
	C30	•	•	中 Medium	15	14.20	87	1070	3500	
	C15	•		细 Fine	13	14.06	91	1550	3600	适用于精密五金薄片冲压、引线框、IC模，不适用厚片冲压 Used for punching precise hardware,ironware sheets,guiding frame,IC dies.Can't be used for puknching thick sheets.
	C35	•		细 Fine	15	13.85	89.5	1320	3700	通过各类薄片冲压、引线框、LED支架、IC模、电机定转子等 Used commonly for sheet punching,guiding frame,LED frame.IC dies,rotor-stator.
	C38	•		中细 Medium fine	12	14.20	89	1400	3300	专用矽铜片、EI片冲压 Used for punching steel sheet,E&I sheet.
	C78	•		细 Fine	12	14.10	90	1450	3950	专用线切割、电火花加工场合 Can be used specially when wire cut,EDM.
	C40	•	•	粗 Tongh	20	13.60	84	850	2850	常用冷冲、冷镦、冷挤模具 Used in common cold punching dies, cold heading dies, cold extruding dies.
	C50	•	•	粗 Tongh	22	13.40	83	780	2950	应用于应力较大的场合，如螺丝、螺母、锻造等 Used when stress is big,such as screw,screw nut forging dies.
超微粒系列 Supering grade	QX05	•		微 Superfine	7.0	14.60	94	1950	3520	极高硬度，只适合冲击力较小耐磨件，刀具 Superhigh hardness,only used for small impacts and knife.
	QX10	•		微 Superfine	8.0	14.60	92.8	1730	3800	
	QX20	•		微 Superfine	10	14.45	91.8	1550	4200	
	QX30	•		微 Superfine	12	14.15	92.3	1640	4000	
高温系列 Hear resistant	R20		•	中 Medium	专利 Patent	13.00	83	780	2550	热锻模 Used in hot forging dies.
	R50		•	中 Medium	专利 Patent	13.20	84	850	2550	热挤中小型型材，热锻模 Medium and small sections extruded,hot forging dies.
非磁性系列 Non magnetic	W10	•	•	中 Medium	Ni	14.30	89.5	1320	1500	应用于应力较小的无磁性磨件 Used in non magnetic wear resistant parts whose's stress is small.
	W10X	•	•	细 Fine	Ni	14.30	92	1760	2700	常用磁性成型模 Used in common magnetic forming dies.
	W30	•	•	中 Medium	Ni	14.00	87	1160	3000	
	W35	•	•	细 Fine	Ni	13.80	86.5	1070	2900	
	W40	•	•	中 Medium	Ni	13.50	85.5	930	3000	

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