半导体精密陶瓷

广东精瓷新材料有限公司
Fine Ceramic New Material Co.,Ltd.

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广东精瓷新材料有限公司
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Company Profile
公司简介

愿景 VISION

成为半导体精密陶瓷的领先者
To be the leader of Semiconductor Fine Ceramic

宗旨 AIM

Fine for you

广东精瓷新材料有限公司具有多年HTCC研发及生产经验，专注于半导体用陶瓷静电卡盘ESC、精密陶瓷真空吸盘及氮化铝陶瓷发热体的研发制造。公司具备年产2000套12寸&8寸氧化铝&氮化铝静电卡盘，20000套300mm以上尺寸碳化硅&氧化铝真空吸盘的生产能力，并设立有ESC专用测试设备、SEM、三坐标、轮廓仪等多种测试设备的测试中心。

Fine Ceramic New Material Co. Ltd. Has many years of experience in HTCC research and production, focusing on the research and manufacturing of ceramic electrostatic chuck ESC for semiconductors, precision ceramic vacuum chuck table, and aluminum nitride ceramic heating elements. The company has the production capacity to produce 2000 EA of 12 inches and 8 inches aluminum oxide and aluminum nitride electrostatic chucks per year, and 20000 EA of silicon carbide and aluminum oxide vacuum chuck table with a size of more than 300 mm. It also has a testing center with ESC dedicated testing equipment, SEM, coordinate measuring machines, and profilometers.

Main Products
主要产品

01

静电卡盘
Electrostatic Chuck (ESC)

02

陶瓷真空吸盘
Ceramic Vacuum Chuck

氮化铝陶瓷发热体
AIN Ceramic Heater

03

Electrostatic Chuck(ESC)

静电卡盘

Electrostatic Chuck(ESC)

静电卡盘

静电卡盘（ESC）是一种利用静电吸附替代传统机械夹持、真空吸附方式的优势技术，在半导体、面板显示、光学等领域中有着广泛应用。

Electrostatic chuck is an advantageous technology that uses electrostatic adsorption to replace traditional mechanical clamping and vacuum adsorption methods, and has wide applications in fields such as semiconductors, panel displays, and optics.

Advantages 优 势

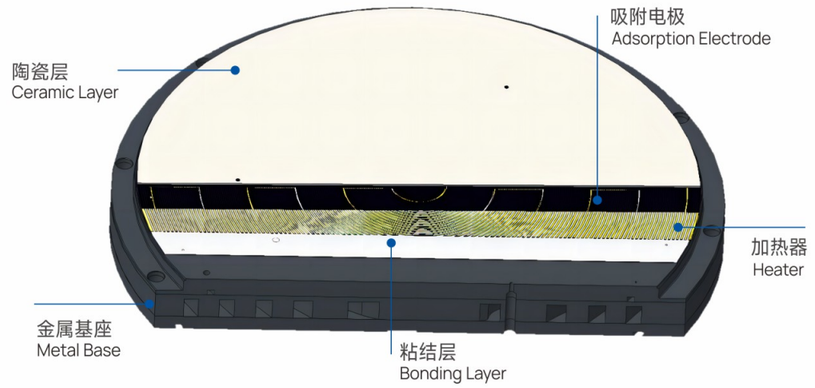
加工一致性高
High processing consistency

机械强度高
High mechanical strength

抗等离子侵蚀性强
Strong resistance to plasma erosion

可定制化
Customizable

Structure
结 构



Coulomb Type
库仑型

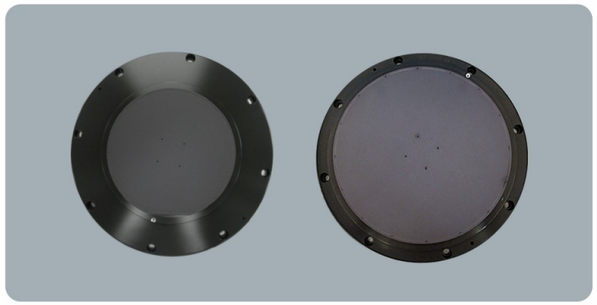
12寸氧化铝静电卡盘
12 Inches Alumina Electrostatic Chuck

12寸复合型静电卡盘
12 Inches Composite Electrostatic Chuck

库仑型静电卡盘，对静电卡盘施加高压直流电时，陶瓷介电层上表面与被吸附产品间产生极性相反的极化电荷，形成了静电吸引力，实现吸附固定。

Coulomb type ESC, when high-voltage direct current is applied to the electrostatic chuck, a polarized charge with opposite polarity is generated between the surface of the ceramic dielectric layer and the adsorbed product, forming a standard electrostatic attraction and achieving adsorption fixation.

J-R Type
J-R型



J-R型静电卡盘，对静电卡盘施加高压直流电时，陶瓷介电层中带电离子迁移并聚集在上表面，在静电卡盘与被吸附产品间形成了很强的电场，实现吸附固定。

J-R type ESC, when high-voltage direct current is applied to the electrostatic chuck, charged ions in the ceramic dielectric layer migrate and aggregate on the upper surface, forming a strong electric field between the electrostatic chuck and the adsorbed product, achieving adsorption fixation.

Main application
应用场景

等离子刻蚀设备
ETCH

离子注入设备
IMP

物理气相沉积设备
PVD

化学气相沉积设备
CVD

Performance 性 能

吸附力 Adsorbability	≧ 50 gf/cm²
工作温度 Operating Temperature	-20°C - 250°C
加热温度 Heating Temperature	30°C - 250°C
表面粗糙度 Surface Roughness	< 0.1 um
工作环境 Working Condition	< $1x10^{-7}$ Torr
气体泄漏率 Gas Leakage Rate	< 7 sccm

- 通过内置吸附电极将产品固定于静电卡盘，以满足加工需要。
- 通过内置加热器控制产品温度，多温区组合控温，保证加工一致性。
- 使用高纯度原料实现低颗粒污染，抗等离子体侵蚀性强。
- 高精度形状加工，优异的机械强度。

- Fix the product to the electrostatic chuck through built-in adsorption electrodes to meet processing needs.
- To control product temperature by using a built-in heater and combining multiple temperature zones for temperature control to ensure the process consistency.
- Using high-purity raw materials to achieve low particle pollution and strong resistance to plasma erosion.
- High precision shape processing, excellent mechanical strength.

Material Parameters
材料参数

项目Item		Unit	Alumina (Al_2O_3)		
产品型号 Product Model		/	AO960	AO995	AO920
外观 Color		/	White	Ivory	Black
密度 Bulk Density		g/cm	3.7	3.9	3.6
吸水率 Water Absorption		%	0	0	0
维氏硬度 Vickers Hardness HV1 (Load=9.807N)		(GPa)	13.7	16.0	12.7
弯曲强度 Flexural Strength (3PB) R.T.		MPa	350	360	320
弹性模量 Young's Modulus of Elasticity		GPa	320	370	320
泊松比 Poisson's Ratio		/	0.23	0.23	0.23
断裂韧性 Fracture Toughness (SEPB)		$MPam^{½}$	/	4	/
线膨胀系数 Coefficient of Linear Thermal Expansion	40°C~400°C	$\times10^{-6}$/°C	7.2	7.2	7.3
	40°C~800°C		7.9	8.0	8.1
热导率 Thermal Conductivity 20°C		W/(m.K)	24	32	12
比热容 Specific Heat Capacity		J/(g.k)	0.78	0.78	0.75
热冲击温度 Heat Shock Temperature		°C	200	250	/
击穿强度 Dielectric Strength		KV/mm	15	15	12
体积电阻 Volume Resistivity	20°C	Ω.cm	$>10^{14}$	$>10^{14}$	$>10^{11}$
	300°C		$>10^{10}$	$>10^{13}$	$>10^{7}$
	500°C		$>10^{8}$	$>10^{10}$	$>10^{5}$
介电常数 Dielectric Constant (1MHz)		/	9.4	9.9	9.8
介电损耗 Dielectric Loss Angle (1MH2)		$\times10^{-4}$	4	1	20
硝酸 Nitric Acid(60%) 90°C, 24H		WT Loss mg/cm^2	/	0.07	/
硫酸 Sulphuric Acid(95%) 95°C, 24H			/	0.23	/
烧碱 Caustic Soda(30%) 80°C, 24H			/	0.05	/

尺寸：200、300 mm（可定制）

Size: 200, 300 mm (Customizable)

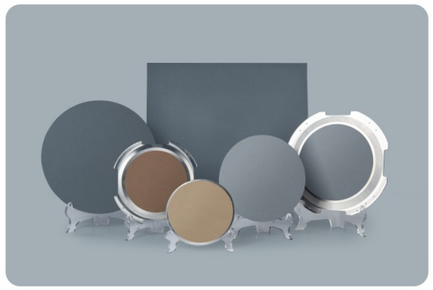
Material Parameters
材料参数

项目Item		Unit	Aluminum Nitride (AlN)	
产品型号 Product Model		/	AN160	AN80
外观 Color		/	Gray	Ivory
密度 Bulk Density		g/cm	3.3	3.2
吸水率 Water Absorption		%	0	0
维氏硬度 Vickers Hardness HV1 (Load=9.807N)		(GPa)	10.4	11.2
弯曲强度 Flexural Strength (3PB) R.T.		MPa	310	220
弹性模量 Young's Modulus of Elasticity		GPa	320	310
泊松比 Poisson's Ratio		/	0.24	0.24
线膨胀系数 Coefficient of Linear Thermal Expansion	40°C~400°C		4.6	4.6	4.6
	40°C~800°C		5.3	5.3	5.3
热导率 Thermal Conductivity 20°C		W/(m.K)	150	70
比热容 Specific Heat Capacity		J/(g.k)	0.71	0.72
击穿强度 Dielectric Strength		KV/mm	14	16
体积电阻 Volume Resistivity	20°C	Ω.cm	$>10^{14}$	$>10^{14}$
	300°C		$>10^{10}$	$>10^{10}$
	500°C		$>10^{8}$	$>10^{9}$
介电常数 Dielectric Constant (1MHz)		/	8.6	8.5
介电损耗 Dielectric Loss Angle (1MH2)		$\times10^{-4}$	3	2

Electrical Parameters
电气参数

工作电压 Operating Voltage Ranges	± 0.5 - 8.0 KV Max HV/DC
最大电流 Max. Current	5 mA DC max
体积电阻 Volume Resistivity	Coulombs: ≥ $1x10^{14}$, Johnsen-Rahbek: $5x10^{11}$
电容 Capacitance	≧ 12.5 nF
电极类型 Electrode Pattern	单极型 Unipolar / 双极型 Bipolar Electrode
漏电流 Leak Current @ ATM	< 5 nA (At ± 500V)
释放时间 Release Time	≤ 1 Second

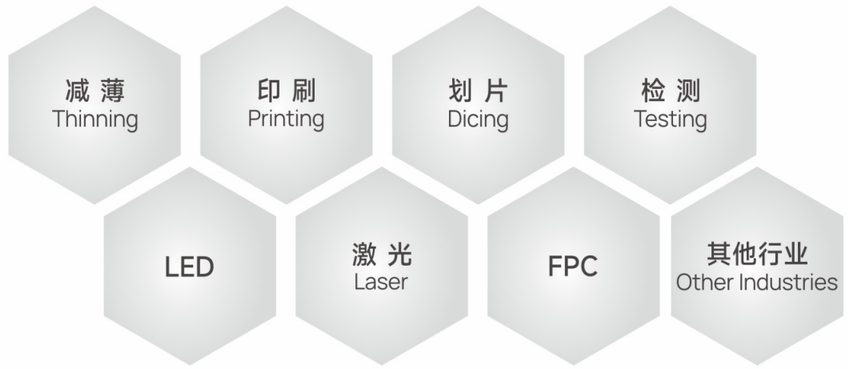
Ceramic Vacuum Chuck
陶瓷真空吸盘



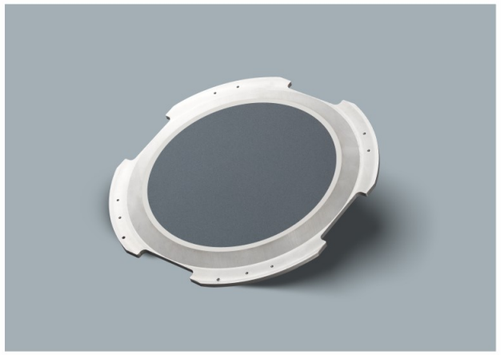
陶瓷真空吸盘主要由微孔陶瓷和框架组成，也可以称为多孔陶瓷卡盘。

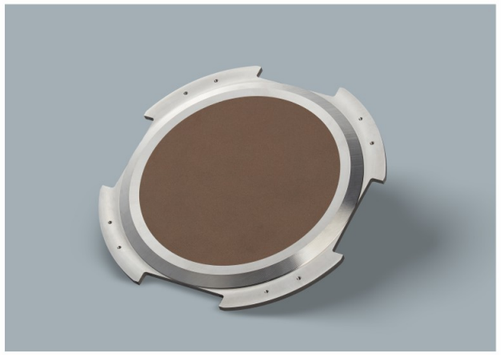
Ceramic Vacuum chuck table are mainly composed of microporous ceramics and frames, also known as porous ceramic chucks.

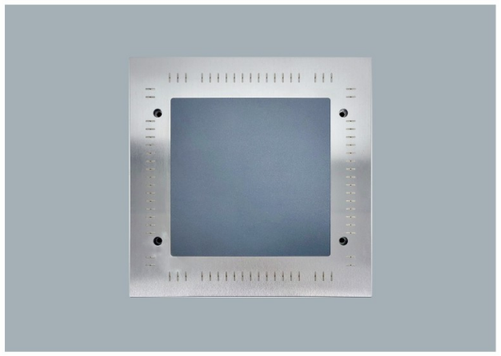
Application
应用领域



Ceramic Vacuum Chuck
陶瓷真空吸盘







Advantages 优 势

平面度、平行度高；
组织致密均匀、强度高；
透气性强：微孔尺寸：5-200 μm，气孔率：30%-50%；
吸附力均匀：10*10 mm区域内压差±3 Kpa（可调配）。

Good flatness and parallelism;
Dense and uniform structure;
Good air permeability: micropore size: 5-200 μm, porosity: 30%-50%;
Uniform adsorbability: uniformity of airpermeability: ±3 Kpa pressure tolerance within 10*10 mm area(adjustable).

Main Features 主要特征

吸收工件并将其涂在真空吸盘上。
将工件浮起并应用于空气浮台和非接触式传送系统。

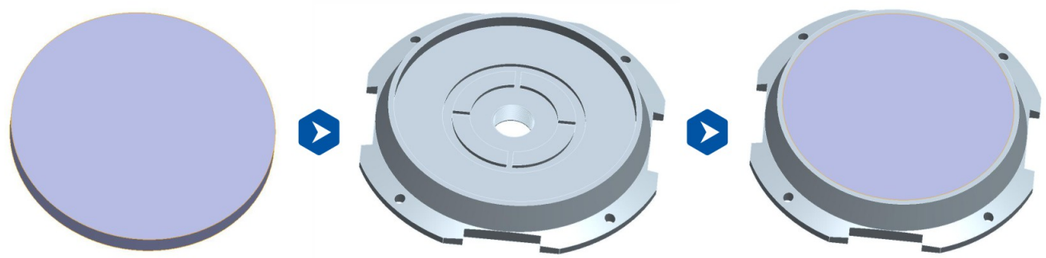
Absorb the workpiece and apply it onto the vacuum suction cup.
Float the workpiece and apply it to the air floating platform and non-contact conveying system.

Application Principles 应用原理

当气流设置为进入陶瓷时（真空压力为负压），可以吸附工件。
当气流设置为从陶瓷流出时（真空压力为正压），该零件可能会鼓起或不与陶瓷接触。

When the airflow is set to enter the ceramic (vacuum pressure is negative pressure), it can be used to adsorb the workpiece.
When the airflow is set to flow out of the ceramic (vacuum pressure is positive), the part may bulge or not come into contact with the ceramic.

Structure 结 构

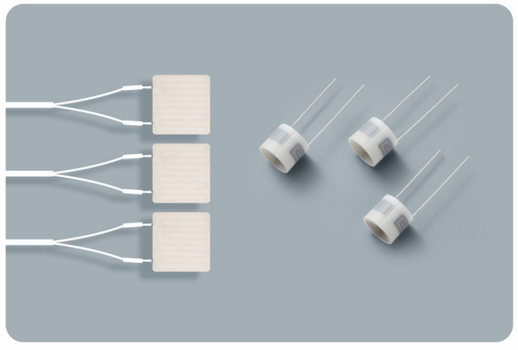


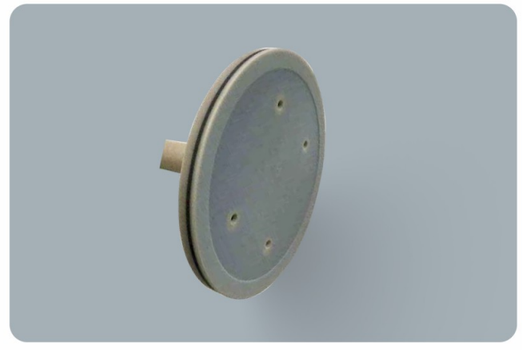
Performance Parameters
性能参数

项目Item				
尺寸 Size	4 inches	6 inches	8 inches	12 inches
平整度 Flatness	3 μm	3 μm	5 μm	5 μm or 10 μm
多孔陶瓷颜色 Color of Porous Ceramics	White, black, brown 白、黑、棕			
多孔陶瓷材料 Material of Porous Ceramics	Aluminum oxide and silicon carbide 氧化铝、碳化硅			
多孔陶瓷孔径 Pore Size of Porous Ceramics	5-200 μm			
孔隙率 Porosity of Porous Ceramics	30%-50%			
底座材料 Base Material	Stainless steel, aluminum alloy, ceramic 不锈钢、铝合金、陶瓷			
防静电功能 Antistatic Function	Optional 可选			
抗折强度 Flexural Strength	55-70 MPa			
体积电阻率 Volume Resistivity	$4.5*10^{7-9}$ Ω.cm			

AlN Ceramic Heater
氮化铝陶瓷发热体

AlN Ceramic Heater
氮化铝陶瓷发热体





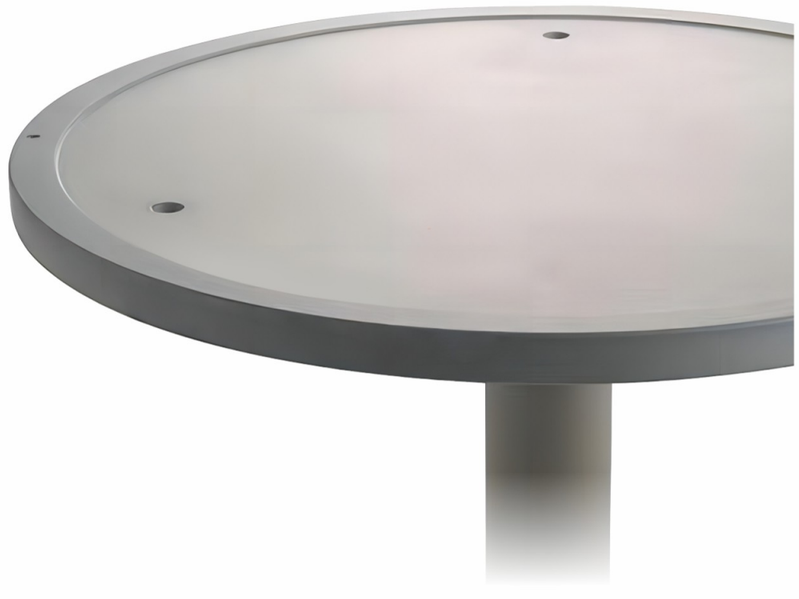
氮化铝是一种多功能材料，最常用于需要高导热性和电绝缘性的场景。这种独特的能力，使AlN成为快速加热、散热的理想选择。如氮化铝陶瓷发热体（heater）、氮化铝陶瓷晶圆托盘/吸盘等。

Aluminum nitride is a multifunctional material most commonly used in scenarios that require high thermal conductivity and electrical insulation. This unique ability makes AlN an ideal choice for fast heating and heat dissipation. Such as aluminum nitride ceramic heaters, aluminum nitride ceramic wafer trays/ceramic chuck table, etc.

Application
应用领域

半导体用：静电卡盘，蚀刻，化学气相沉积，抛光；
医疗设备：加热，雾化；
其他应用：用于其他要求升温速度快，温度均一性好的场景。

Semi-conductor: ESC, etch, CVD, polishing machine;
Medical Devices: heating and atomization;
Other: used in other scenarios that require fast heating rate and good temperature uniformity.



Characteristic
产品特点

热导率：热导率为氧化铝陶瓷的10倍，热导率接近金属铝。升温速度快：室温25°C在6秒内达到600°C；温度均一性好：温差±5°C以内。

强度：抗弯强度310-350 MPa；硬度：HRA 89；体积电阻率：$>10^{13}$ Ω.cm。

稳定性：氮化铝陶瓷的熔点为2450°C，在2000°C以内的高温非氧化气氛中稳定性好。

优良的介电常数和低的介质损耗。

尺寸：Ø 5，Ø 9×34，Ø 50 mm（可定制化）。

Thermal conductivity: 10 times compare to alumina ceramics. Fast heating rate: can reach 600°C within 6 seconds at 25°C ambient temperature. With good temperature uniformity: the temperature difference is within ±5°C.

Strength: flexural Strength 310-350 MPa. Hardness: HRA 89. Volume Resistivity: $>10^{13}$ Ω.cm.

Stability: the melting point of aluminum nitride ceramics is 2450°C, and it has good stability in high temperature non oxidizing atmospheres within 2000°C.

Excellent dielectric constant and low dielectric loss.

Size: Ø 5, Ø 9×34, Ø 50 mm (Customizable).

Material Parameters
材料参数

陶瓷种类 Ceramic Types	密度 Density (g/cm^3)	抗弯强度 Bending Strength (Mpa)	断裂韧性 Fracture Toughness ($Mpa.m^{½}$)	干烧功率密度 Dry Burning Power Density (W/cm^2)	热震性 Thermal Shock Resistance (°C)	膨胀系数 Coefficient of Expansion (10-6/°C)	热导率 Thermal Conductivity (W/m.K)	使用温度 Operation Temperature (°C)
氮化铝 Aluminum Nitride	3.2-3.4	310-500	3.5~4.5	96 (负载可达160)	500	4-5	170-260 (Theory 320)	1200
氮化硅 Silicon Nitride	3.0-3.4	600-1000	4-7	25	400-800	2.6-3.9	20-25	1400
95氧化铝 95 Alumina	3.7-3.8	280-300	3-4	10	220	6-8	18-35	1100

Performance Parameters
性能参数

项目Item	
室温抗折强度 Room Temperature Flexural Strength	≥ 320 Mpa
体积密度 Bulk Density	3.20-3.4 g/cm^3
室温相对介电常数 Room Temperature Relative Dielectric Constant	8.8-8.9
热膨涨系数 Coefficient of Thermal Expansion	$4.5×10^{-6}$/°C
干烧功率密度 Dry Burning Power Density	96 W/cm^2
室温断裂韧性 Room Temperature Fracture Toughness	4.5 $Mpa.m^{½}$
室温体积电阻率 Room Temperature Volume Resistivity	$>10^{13}$ Ω.cm
热导率 Thermal Conductivity	170-260 W/(m-k)
硬度 Hardness	HRA 89
负载功率密度 Load Power Density	160 W/cm^2

Equipment Introduction
设备介绍

流延机
Tape Casting Machine

高温烧结设备
High Temperature Sintering Equipment

印刷机
Printing Machine

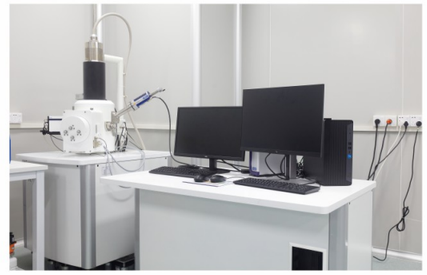
排胶炉
De-binder Furnace

温等静压机
Warm Isostaic Press

叠层设备
Laminating Machine

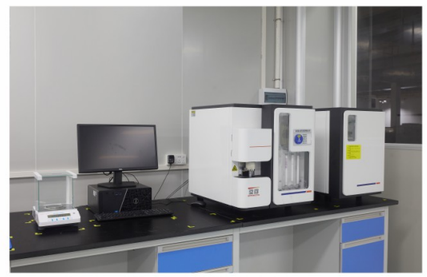
Testing Equipment
检测设备

ESC试验仪
ESC Tester

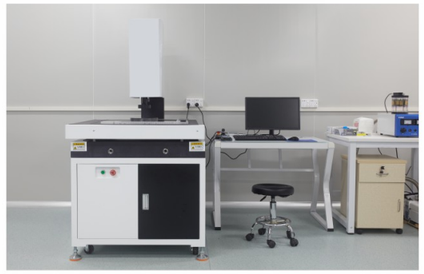


扫描电镜
Scanning Electron Microscope

三坐标测试仪
Three Coordinate Measuring Machine



碳硫分析仪/氧氮分析仪
CS Analyzer / ON Analyzer



二次元测试仪
Quadratic Element Measure

粗糙度-轮廓度仪
Roughness & Profile Measuring Instrument