



中国四联

航天军工特种光学器件

产品手册

Product manual

四联在用户身边，用户在四联心中



重庆四联特种装备材料有限公司

Chongqing Silian Special Equipment Material Co., Ltd.



重庆市北碚区蔡家岗镇蔡和路879号

No.879 CaiHe RD, Caijiagang Town, Beibei District, Chongqing, China

/

☎ +86-23-63220908 ☎ +86-23-63228525

✉ sltc@chinasilian.com.cn 📠 400701



SLTC

四联特材

重庆四联特种装备材料有限公司

Chongqing Silian Special Equipment Material Co., Ltd.





企业简介

重庆四联特种装备材料有限公司成立于2011年12月8日，位于重庆市北碚区蔡家岗镇蔡和路879号，隶属于中国四联仪器仪表集团有限公司，是其全资子公司。公司下设一家分公司和三家参股公司，分别为重庆四联特种装备材料有限公司电磁阀分公司、重庆安美科技有限公司、重庆荣凯川仪器仪表有限公司及重庆川仪精密机械有限公司。公司拥有包括劳尔、离子束、大尺寸干涉仪、机、钎焊炉、CCOS等在内的光学加工及检验设备，具备年生产2000件高精度光学产品和光学系统集成能力。

提供包括蓝宝石、硫化锌、氟化镁、尖晶石、特种陶瓷、特种玻璃等多种光学材料的光学球罩、光学平面窗口、超半球视窗、光学元器件/组件、光电集成等产品；覆盖紫外、可见、激光、红外等光学和光电应用领域；拥有光学材料生产、光学元件加工、光学镀膜、电磁屏蔽网栅、离子束处理、焊接、光电系统设计等多项技术。

秉承“产品立位、质量立身、专业专注、创新超越”持续发展理念和“用户在四联心中、四联在用户身边”的服务宗旨，为客户提供优质的产品和服务，深受国内外客户好评。



Chongqing Silian Special Equipment Material Co., Ltd was established on December 8th 2011, which is headquartered in the NO. 879 CaiHe Road, CaiJiaGang Town, Beibei District, Chongqing, China. It is a wholly-owned subsidiary of China Silian Instrument Group Co., LTD. The company has a branch and three joint-stock companies, namely Chongqing Silian Special Equipment Materials Co., Ltd. Solenoid Valve Branch, Chongqing AnMei Tech.Co., LTD., Chongqing RongKai ChuanYi Co., Ltd. and Chongqing ChuanYi Precision Machinery Co., LTD. We now possess various advanced optical processing and inspection equipment, such as RAL, ion beam, large size interferometer, coating machines, brazing furnaces, CCOS etc. which makes us fully qualified to integrate optical system and produce optical products with high precision no less than 20000 pieces per year.

We are now mainly engaged in the optical and optoelectronic field where there covers the application of violet light, visible light, laser and infrared light. Therefore, our primary product chain contains domes, optical flat windows, Hyper-hemispherical windows, optical components and optical parts, etc, which have been widely promoted around our domestic and foreign market. We now can we perform in multiple technologies, such as producing optical materials,

optical processing, optical coating, electromagnetic shielding grid designing and producing, ion beam dealing, soldering, optoelectronic system designing etc.

The service tenet we consistently pursuing is "Silian is guided by you and here for you.", and we always persist in the sustainable development concept of being competitive both in quality and service, being professional and being innovative. Over the years, we do our all endeavor to provide our customers with the excellent products as well as services, which has received plenty positive feedbacks.





公司理念

产 品 立 位
质 量 立 身
专 业 专 注
创 新 超 越

产品
目录

CONTENTS

- 光学材料 01

Optical Materials

- 光学加工 02-05

Optical Manufacture

- 光学镀膜 06

Coating

- 电磁屏蔽网栅 07

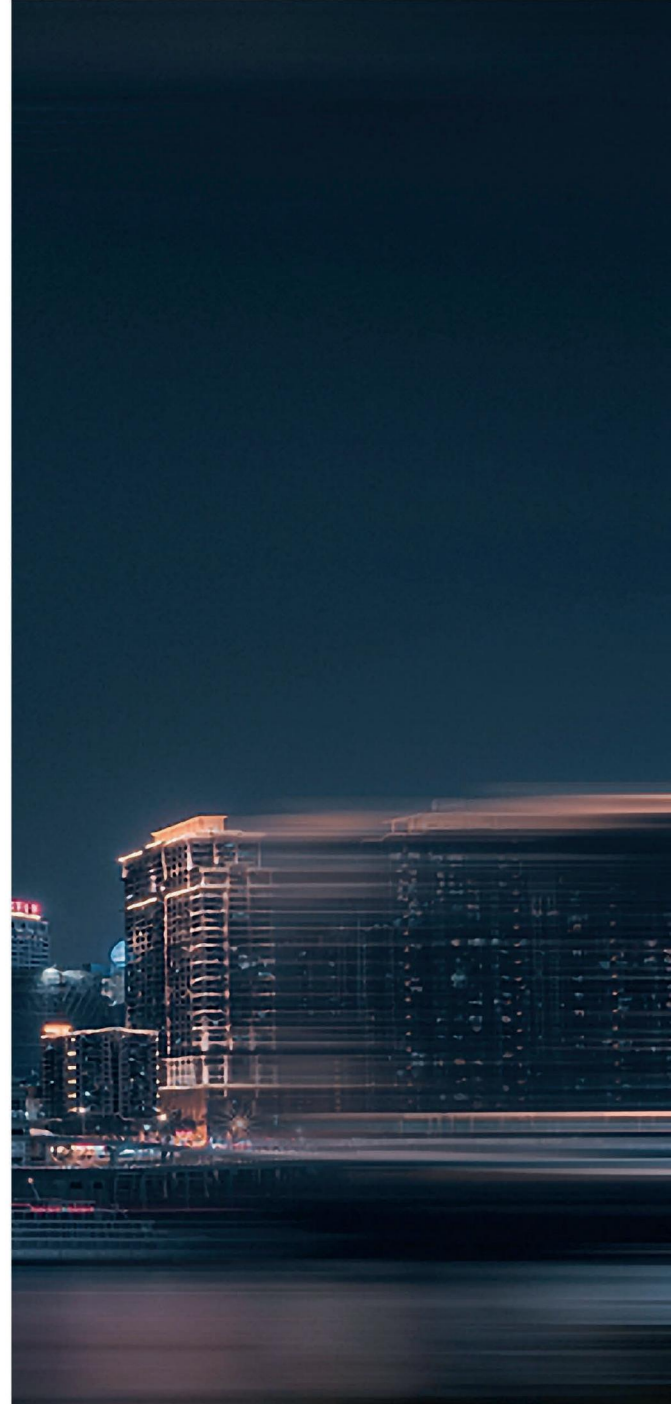
Electromagnetic Shielding Grid

- 焊接产品 08

Welding Products

- 光学镜头 09

Optical Lenses



光学材料

长期稳定提供蓝宝石、(多光谱)硫化锌、氟化镁、尖晶石、特种陶瓷、特种玻璃等光学材料，覆盖紫外、可见、激光、红外等波段。

SLTC has an enough capability to always supply Sapphire, Multispectral Zns, MgF_2 , Spinel, special ceramics, special glasses and other optical materials, which has covered ultraviolet, visible light, laser and infrared fields.

蓝宝石



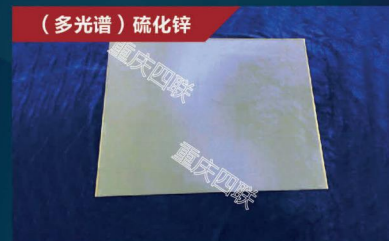
长期稳定提供大尺寸蓝宝石晶体，晶棒，平板材料等。蓝宝石具有稳定的物理化学性能、较好的透过率、优良的抗热冲击性使其成为高速飞行器上能同时运用在紫外、可见光和中波红外最理想的窗口和球罩材料，其次在光学窗口、光学镜头保护窗、医疗器械或其他恶劣环境中广泛运用。

SLTC is professional in steadily supplying various large size crystal, crystal bars, windows and other products in Sapphire. When combining with its stable chemical and physical properties, high transmittance, strong thermal shock resistance and being available in ultraviolet, visible light and middle infrared fields at the same time, it is treated as one of the most ideal materials to be applied in high-speed aircrafts. Generally it is widely used in medical apparatus and instruments and other environmental extremes or as optical windows or protective windows for optical lenses.

可提供热压硫化锌、CVD硫化锌和多光谱CVD硫化锌三种类型，在1000nm-12000nm波段具有很好的图像传输性能，广泛应用于光学窗口、光学镜头、光电成像等领域。

SLTC now could supply the Hot Pressed Zns, CVD Zns and Multispectral CVD Zns, which are fully qualified in transferring images during a wavelength range of 1000nm-12000nm. They are now very popular in optical windows, optical lenses and photoelectronic imaging fields.

(多光谱) 硫化锌



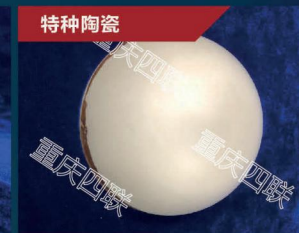
氟化镁



尖晶石



特种陶瓷

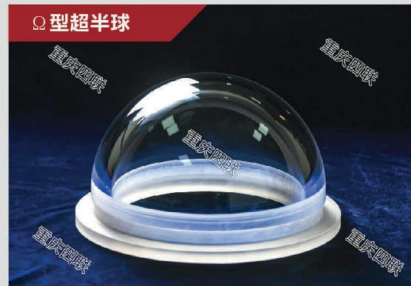
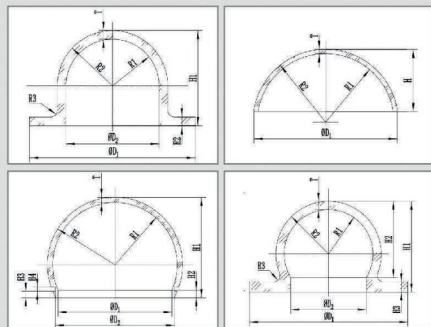


光学加工

光学球罩 |

可对蓝宝石、硫化锌、氟化镁、玻璃、尖晶石等材料加工 $\Phi < 400\text{mm}$, $\Delta N \leq 0.3$, B:40-20的球罩, 其形状包含球冠球罩、半球球罩、切口球罩、 Ω 型或开槽型超半球罩(3/4D)等。主要运用于红外制导及观察窗口。

SLTC has an abundant experience and a long history in producing different domes including hemispheric and hyper-hemispheric domes, domes with a kerf and domes in a spherical crown shape, in sapphire, Zns, MgF, glass, spinel etc. Among which the largest diameter we could produce for domes could reach 400m. These products are usually been applied in guided missile and observation windows and other fields.



超半球 / 半球 / 球冠



切口球罩



多光谱硫化锌球罩



氟化镁球罩



光学加工



光学平面

专业生产蓝宝石和硫化锌等材料口径达600mm×600mm，RMS: $1/60\lambda$ ， $//$: $1''$ ，B: 20-10的平面窗口，其作为一种重要的光学零件在航拍航摄观察窗口、红外光学窗口、高功率激光器窗口以及真空密闭窗口等领域得以广泛地应用。

SLTC has won words of mouth in producing different flat windows both in sapphire and Zns. Now the largest size we could reach for windows is 600mm X 600mm, surface precision is up to RMS $1/60\lambda$, parallel error is less than $1''$ and the surface quality is higher than 20-10. In aerial photography observation windows, infrared optical windows, high powered laser windows and vacuum closed windows, it serves as an essential material widely being made use of.

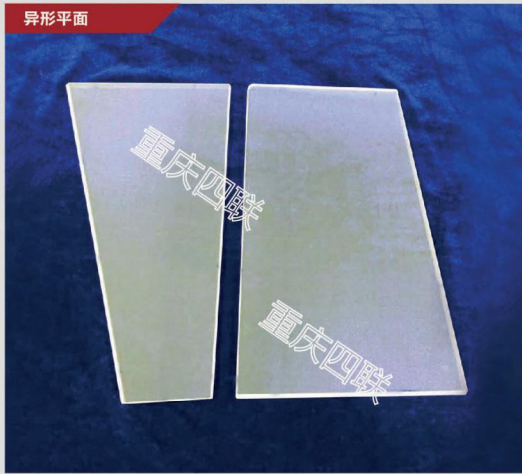
锥面窗口



拼接平面



异形平面



硫化锌平面



蓝宝石图片



光学加工

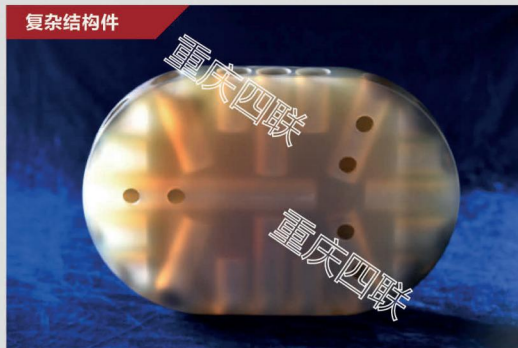


特殊异形产品 |

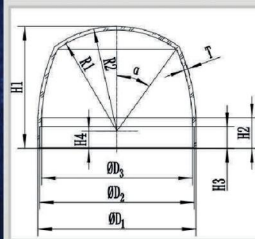
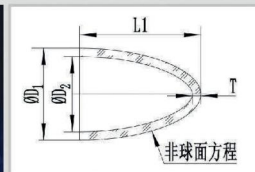
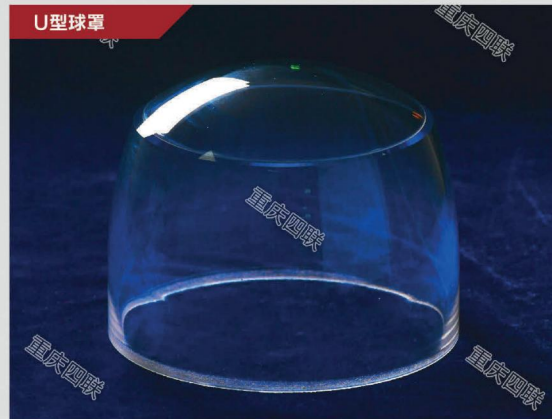
为满足客户不同设计需要，结合行业前沿技术，研制专用工艺及设备，完成各类光学材料各类特殊形状产品的加工制造，如：柱面镜，U型球罩，保型球罩，复杂结构件等。

In order to satisfy different market needs, SLTC has absorbed advanced technologies and innovative ideas for researching professional devices to produce high qualified products. Now SLTC could individually produce optical products, such as cylindrical mirror, U-shaped domes, complex parties etc. both in various shapes and in different optical materials.

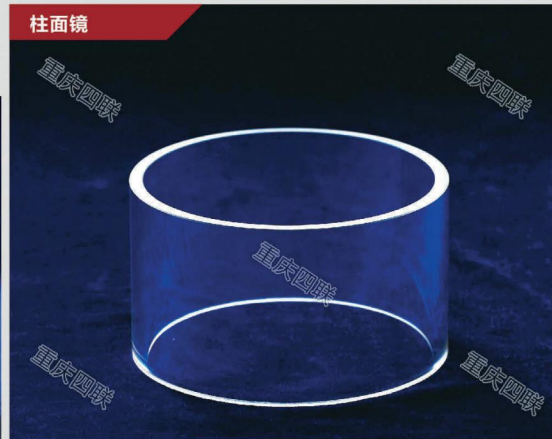
复杂结构件



U型球罩



柱面镜



保型球罩



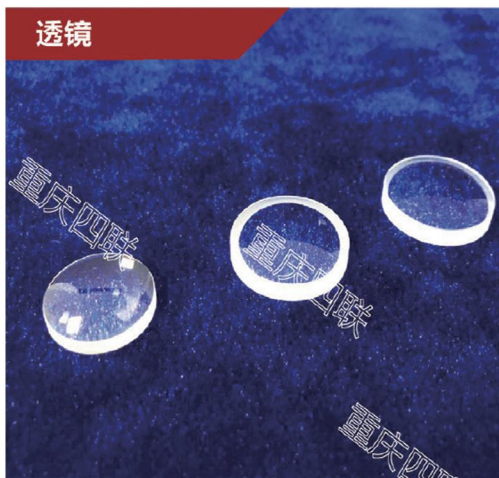
光学加工

光学元器件 |

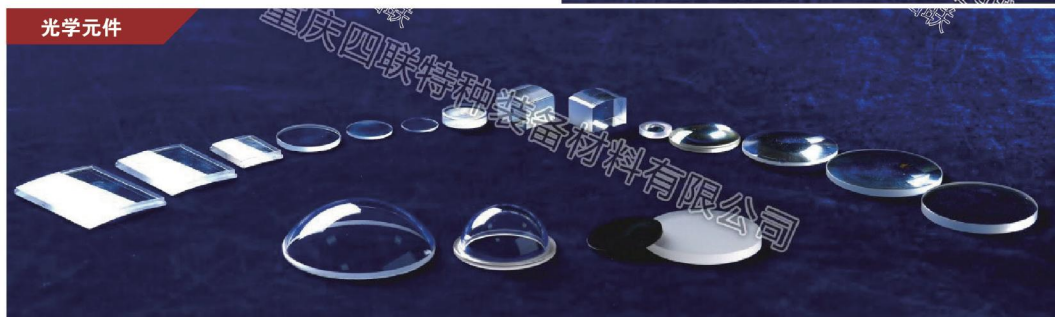
可生产各类光学元器件，如：棱镜、透镜、反射镜、滤光片等，含非球面加工，可提供定制材料：蓝宝石、硫化锌、单晶硅、单晶锗、硒化锌等，同时满足各类光学部件及光学系统的需求。

SLTC have the capability for precisely producing various optical components, such as, prism, lens, mirrors, optical filters, aspheric products and other optical components or even designing optical systems. SLTC also has an enough capability to always supply Sapphire, ZnS, Si, Ge, ZnSe and other materials.

透镜



光学元件



光学镀膜

能够稳定提供在蓝宝石、硫化锌等基底材料上镀制减反射膜、高反膜、金属高反膜、分光膜、截止滤光膜的薄膜元件，具有良好的光学性能、机械性能、化学稳定性和较高激光损伤阈值。

现已实现了超半球罩、棱镜、透镜、滤光片、反射镜、平面窗口、球面窗口的镀膜，尤其是超半球镀膜的突破，其均匀性及牢固性也都得到了很大的提升。

相关产品已被广泛地运用于可见光、近、中红外波段的引力波探测、空间对抗、航空航天、红外相机、多光谱成像仪、夜视产品、热成像探测、激光雷达等。

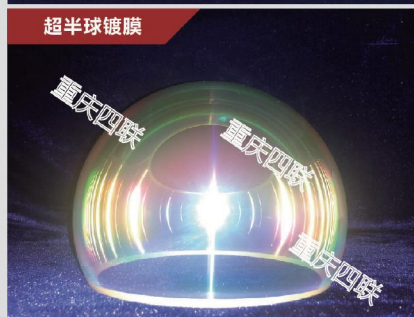
SLTC now is professional in coating antireflection film, high-reflective film and spectroscopic film etc. on sapphire, Zns and other optical materials, which could achieve the excellent optical properties, strong mechanical properties, stable chemical properties and high laser induced damage threshold etc.

SLTC now has an abundant experience in coating hyper-hemisphere domes, lenses, mirrors, large windows both in circle or rectangle, reflectors and flat and spherical windows. SLTC now not only has made a breakthrough for coating on hyper-hemisphere domes but has improved its homogeneity and solidity. Many of these products are now extensively being applied in gravitational wave detector, space countermeasure machines, aerospace fields, infrared cameras, multispectral imager, night-vision products, IR imaging device, laser radar, etc. which are concerning to visible light fields, near-infrared and middle-infrared areas.

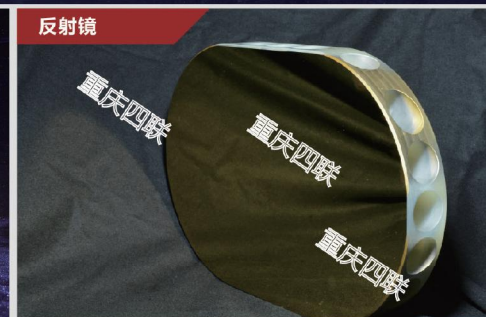
镀膜



超半球镀膜



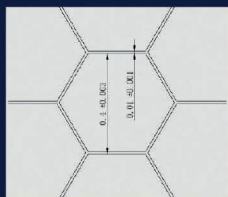
反射镜



电磁屏蔽网栅

可专业化设计生产自由曲线（随机）网栅、圆形网栅、六边形网栅以及传统#字形网栅。其运用于球面，平面窗口等。提升了电磁辐射干扰及隐身效能。

This mental mesh grid by using laser director writing technology or mask method it can be qualified with an excellent infrared transmittance and high electromagnetic shielding property. The application of electromagnetic shielding grid technology not only enables non-metallic products to resist electromagnetic radiation but to satisfy certain optical transmittance. SLTC now has full qualified in fabricating mesh in circle, hexagon, # or free-form curve on domes or windows so that improving its interference of electromagnetic radiation and stealthy effectiveness.



六边形网栅



井字形网栅

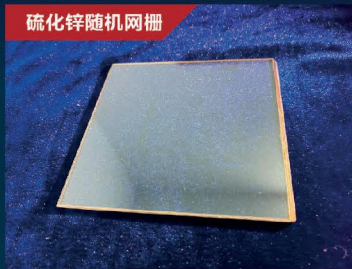


随机网栅



圆形网栅

硫化锌随机网栅



球面网栅



平面网栅



氟化镁网栅



焊接产品



可提供蓝宝石球罩和钛合金壳体之间的钎焊焊接。钎焊相比于其他的连接方式具有较高的使用温度（能耐800℃以上），较高的连接强度（抗拉强度可达150Mpa以上），和极好的真空气密性，能够满足苛刻的使用环境要求。

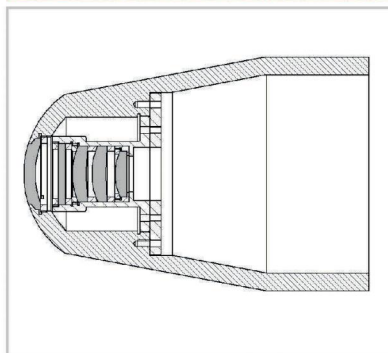
SLTC now can provide brazing welding between sapphire domes and titanium alloy housings. Compared to other connection methods, brazing offers a higher operating temperature (capable of withstanding temperatures above 800 °C), greater connection strength (tensile strength can exceed 150MPa), and excellent vacuum tightness, meeting the stringent requirements of demanding operating environments.

光学镜头

可根据客户需要设计、组装、调试光学组件及光路系统。

SLTC could now specifically design, assemble as well as debug different optical components and optical systems to satisfy different customers' needs.

光学镜头



制造与检测



拥有KY和CZ蓝宝石晶体生长炉。

材料生长

具备光学加工的整套设备及工艺。

研磨抛光

通过离子束、磁流变等高精度设备的引进，使得光学平面 $RMS:1/60\lambda$ ， $//:1''$ 。

高精度加工

拥有1.6m大尺寸镀膜设备，满足超半球镀膜及各种网栅镀制。

镀膜+网栅

拥有 $\Phi 450mm$ 真空高温焊接炉。

焊接

拥有 $\Phi 450mm$ 口径干涉仪，三坐标，光谱仪、球径仪等检测设备。

品质检测