

## 单晶蓝宝石激光传输头（激光医疗设备和牙科激光应用）

弯钩状的蓝宝石光纤牙科激光传输头，这种可拆卸的激光传输头设计简洁，提高牙科激光仪器手持部分的可靠性和可消毒。

蓝宝石单晶光纤传输典型的 Er: YAG 激光，波长为 2.94 $\mu$ m，是非常可靠的，材料完全生物兼容无毒，也可以拆卸下来高温灭菌消毒。

以往的传统做法是光纤传输激光到机头，然后用 90 度弯曲镜来引导光束，再进入一条直线蓝宝石头。然而弯曲镜和准直系统很昂贵，同时准直非常困难。针对该问题，我们的钩状的蓝宝石激光传输头可以直接取代弯曲镜和准直系统，是激光直接从设备传输到治疗的部位。成本低而且性能可靠。

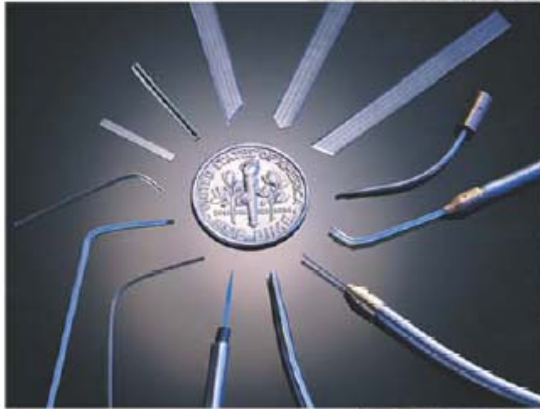
常规的牙科蓝宝石传输光纤用 425 微米直径的，传输头则稍微大一点。目前我们提供的传输头有：直径为 425 $\mu$ m，600 $\mu$ m 和 700 $\mu$ m 的，弯曲角度通常为 50 度和 80 度。弯曲半径为 10 – 15mm。



**单晶蓝宝石激光传输头**  
(全透明的，外包一层 PTFE 的保护层)

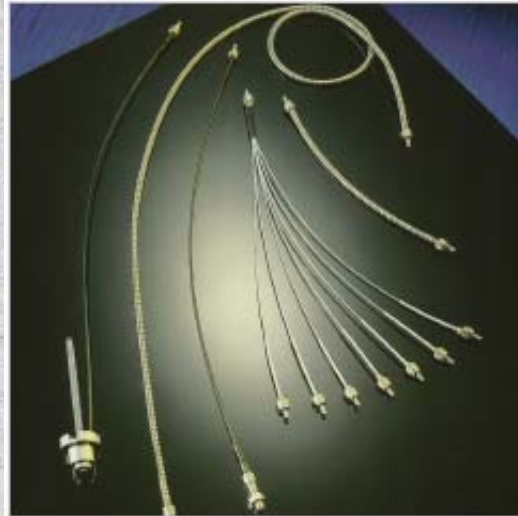
### 激光传输应用

Er: YAG 激光器产生的光束的波长为 2.94 微米。该波长激光非常有用，尤其用于医疗和牙科手术上。目前只有蓝宝石光纤能够把 2.94 $\mu$ m 激光有效地传输到外科医生或牙医的手持设备上。蓝宝石光纤不仅传输 2.94 $\mu$ m 波长激光，同时具有生物惰性和高温高压灭菌性。蓝宝石光纤虽然受最小弯曲半径的限制，但具有灵活，可以用不锈钢铠装。蓝宝石纤维是成本更低地替代笨拙的关节臂的一个有效方案。



### Sapphire Tips and Probes

- Straight Tips
- Curved / Bent Tips up to 90°
- Tapered Tips and Specials



The single crystal fiber transmits from the near UV to 4.5  $\mu\text{m}$  in the infrared and is ideal for use in very high temperature and highly corrosive environments.

## 蓝宝石单晶光纤的用途

### Typical Laser and Medical & Dental Uses

- Er:YAG dental lasers – hard and soft tissue
- Er:YAG trunk fibers – transmission at 2.94  $\mu\text{m}$
- Dental handpiece tips – straight and curved
- Medical lasers – lithotripsy, bone surgery
- Bio-compatible, non-toxic – USP Class IV
- Nd:YAG high power – >1200 J/cm<sup>2</sup> damage

### Laser Components Offers a Range of Customer Choices

- PTFE buffered fibers
- Flexible fiber bundles
- Trunk fibers
- Full delivery systems and hand-pieces
- Armourd assembly
- Flexible, durable assemblies
- Catheters
- Sapphire tips and probes
- Straight tips
- Curved tips up to 90 degrees
- Plastic or metal sheath for increased strength
- Choice of terminations-SMA, Power SMA or custom assemblies



Exceeding Your  
Expectations  
We Build

深圳市罗杰科技有限公司  
SHENZHEN SCIFLOW TECHNOLOGIES CO LTD  
[www.sciflow.com](http://www.sciflow.com) [eleflow@163.com](mailto:eleflow@163.com)

## 蓝宝石光纤特性

### Properties of Single Crystal Sapphire

Refractive Index (Ordinary Ray)

$\lambda$ ( $\mu\text{m}$ )	0.265	0.297	0.365	0.579	0.894	1.693	2.249	3.303
n	1.834	1.816	1.794	1.769	1.758	1.744	1.732	1.702
Sellmier Coefficients	$A_1 = 1.023798$ $A_2 = 1.058264$ $A_3 = 5.280792$			$\Lambda_1 = 0.00377588$ $\Lambda_2 = 0.0122544$ $\Lambda_3 = 321.3616$				
Thermal Coefficient of Index	appx. $13 \times 10^6/\text{deg. C}$ in visible region. Our sapphire fibers are grown along the crystallographic c-axis $\langle 0001 \rangle$							
Specific Gravity	3.98							
Hardness	1525 Knoop, Mohs 9							
Melting Point	2040 C							
Tensile Strength:	275 to 400 MPa (40 - 58 kpsi)							
Compressive Strength	2.0 GPa (300 kpsi)							
Young's Modulus	345 GPa ( $50 \times 10^6$ psi)							
Thermal Conductivity	0 C = 46.06 W/mK 100 C = 25.56 W/mK 12.56 W/mK (Sapphire's thermal conductivity at liquid N2 temperature is greater than silver's)							
Specific Heat	0.10 cal/gC							
Thermal Expansion Coefficient	20 - 500 C = $7.7 \times 10^{-6}/\text{C}$							
Effective NA	0.12							



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[www.sciflow.com](http://www.sciflow.com)

QQ: 917967837

Email: [eleflow@163.com](mailto:eleflow@163.com)

电话: 13927451957