

# WPT Western Photonics Technology



**Miniature Optics**

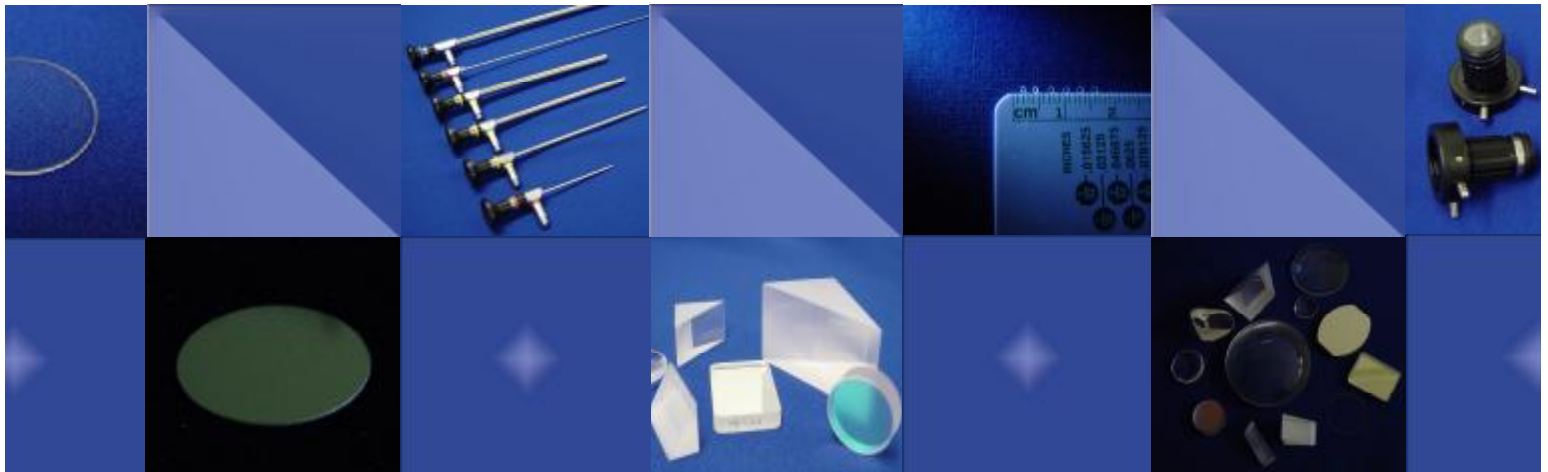
**Optics**

**Fiber Optics**

**Borescopes**

**Lasers**

**Hologram**



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Miniature Optics: Lens, prism, window and ball lens, etc.



## Optics

Window, spherical lens, cylindrical lens, aspherical lens, prism, ball lens; single lens, doublet & triple lens, objective, eyepiece; mirror, laser mirror, filter, beam splitter, waveplate, polarizer, reticle, optical grating, etc.



Window: square window, round window, high precision window.

Lens: plano-concave lens, plano-convex lens, concave-concave lens, convex-convex lens, meniscus lens, plano-concave cylindrical lens, plano-convex cylindrical lens, ball lens, cemented lens, hyperboloidal lens, elliptical lens.

Prism: wedge prism, boot prism, pipe prism, cube prism, roof prism, dove prism, porro prism, pechan prism, rhomboid prism, trapezium prism, equilateral prism, penta prism, isosceles prism, right angle prism.

Filter: interference filter, broadband filter, long pass filter, short pass filter.

Specifications	
Surface Accuracy:	$\lambda/4$ to $\lambda/20$
Surface Quality:	60-40 to 10-5
Diameter Tolerance:	+0.0/-0.1mm to +0.0/-0.04mm
Center Thickness Tolerance:	+/-0.1mm to +/-0.02mm
Wedge Angle:	<5 arcmin
Focal Length Tolerance:	+/- 1%
Dimension:	from 0.5mm to 800mm

## IR, Visible, UV Optics

Sapphire, Fused Silica, Germanium, ZnSe, ZnS, Silicon, CaF<sub>2</sub>, MgF<sub>2</sub>, BaF<sub>2</sub>, BK7, SF<sub>6</sub>, LaKN22, Schott Zerodur, Corning Pyrex 7740, etc.

Sapphire Properties	
Density:	3.98 g / cm <sup>3</sup> at 25 °C
Young's Modulus:	335 GPa
Poisson's Ratio:	-0.02
Hardness (Knoop):	1370 psi
Specific Heat at 25 °C:	0.18 cal / g - °C
Coefficient of Linear Expansion:	7.7 x 10 <sup>-6</sup> / °C
Melting Point:	2040 °C
Refractive Index at 2500nm:	1.73
Transmission Range:	150nm to 5500nm

Germanium Properties	
Density:	5.323 g / cm <sup>3</sup> at 25 °C
Young's Modulus:	14.9 Mpsi
Poisson's Ratio:	0.28
Hardness:	780 kg / mm <sup>2</sup>
Specific Heat at 25 °C:	0.31 J / g - °C
Coefficient of Linear Expansion:	5.7 x 10 <sup>-6</sup> / °C
Melting Point:	936 °C
Refractive Index at 3000nm:	4.05
Transmission Range:	1.8 μm to 23 μm

## Laser and Optical Crystals

Laser and Optical Crystals: Nd:YAG, Nd:YVO<sub>4</sub>, Nd:YLF, Nd:GdV<sub>4</sub>, CTH:YAG, Er:YAG, Yb:YAG, Nd:Glass, YAG, BBO, LBO, KTP, LiNbO<sub>3</sub>, YVO<sub>4</sub>, etc.

Nd:YVO <sub>4</sub> Properties	
Lasing wavelength:	1064nm, 1342nm
Thermal optical coefficient (300K):	$dn_o / dT = 8.5 \times 10^{-6} / K$ $dn_e / dT = 2.9 \times 10^{-6} / K$
Stimulated emission cross section:	25 x 10 <sup>-19</sup> cm <sup>2</sup> at 1064nm
Fluorescence lifetime:	90 μs (1% Nd doping)
Absorption coefficient:	31.4 cm <sup>-1</sup>
Gain bandwidth:	0.96 nm at 1064nm



## Coating, IR, Visible, UV

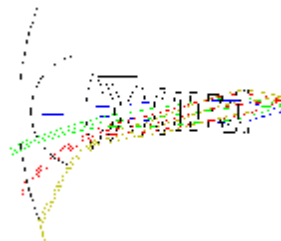
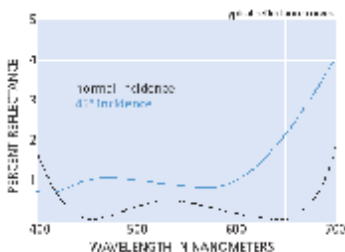
Wavelength range: 250 nm to 12  $\mu\text{m}$ .

Typical Coatings: Multi-Layer Dielectrics. Polarizing and Non-Polarizing Coatings. Filters, Narrow Band, Dichroic, Neutral Density, Notch (Minus). Beamsplitters, Cube Type, Plate Type. Anti-Reflection Coatings, Single Layer, High Efficiency Multi-Layer (Broadband), Laser V, Double Laser V. Transparent Conductive Coatings. Infrared Coatings. Partial Reflectors. Metallic Mirrors (Protected and Enhanced), Aluminum, Silver, Gold. Reflective Coatings. "Hot" and "Cold" Dielectric Mirrors. Custom High Temperature Color Filters. High Laser Damage Threshold, Anti-Reflectance, High Reflectance. Specialized Custom Design.

Optical System: fabrication, assembly and custom design.

## Fiber Optics

Fiber pigtail, fiber optic connector and patch cord, high power fiber optic connector-SMA905, fiber optic faceplate, fiber optic attenuator, fiber optic coupler, wave division multiplexer (WDM/CWDM/DWDM), fiber optic isolator, fiber optic filter, fiber optic collimator, fiber optic circulator, fiber grating, ferrule and sleeve, fiber optic cable and terminal box; optical fiber taper, fiber light bundle, fiber image bundle, laser fiber, etc.



## Borescope / Endoscope (autoclavable)

IR, visible, UV rigid/flexible borescope, high temperature borescope, endoscope.

Specifications	
Outer diameter:	1 mm to 20mm
Working length:	Up to 1400mm
Field of view:	70 <sup>0</sup>
Direction of view:	0 <sup>0</sup> , 15 <sup>0</sup> , 30 <sup>0</sup> , 45 <sup>0</sup> , 70 <sup>0</sup> , 90 <sup>0</sup>
Focusing range:	0 to infinite

## Laser / Laser System

Lasers: CTH:YAG laser, Nd:YAG laser, CO2 laser, diode laser.

Wavelengths: 266nm, 355nm, 457nm, 473nm, 532nm, 808nm, 880nm, 940nm, 980nm, 1064nm, 1320nm, 1550nm, 2100nm, 2900nm, and 10.6um etc.

CTH:YAG Laser Specifications	
Wavelength:	2100nm
Pulse energy:	0.2 J to 5.0 J
Repetition rate:	5 to 20 Hz
Average power:	30W, 50W
Pulse duration:	200μs, 800μs
Pulse peak power:	15 kW
Fiber delivery:	Option

## Camera (CCD/CMOS)

## Hologram (Label / Film / Grating)



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