

# MATERIAL PROPERTIES & SPECIFICATIONS



## Zinc Selenide (ZnSe)

Zinc Selenide crystals have a cubic zinc blende structure, similar to another compound semiconductor like gallium arsenide (GaAs). The crystal lattice consists of alternating layers of zinc and selenium atoms. This structure gives ZnSe its unique optical and electronic properties that make the crystal suitable for various applications in optoelectronics and photonics. One of the notable characteristics of ZnSe is its wide and direct bandgap of approximately 2.7eV, that corresponds to the near IR region of the electromagnetic spectrum. ZnSe is commonly used in collimators for biomedical and military applications. Moreover, ZnSe lenses are particularly well suited for use with high power CO2 lasers.

	Zinc Selenide	ZnSe
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Thermal properties	
Coefficient of Thermal expansion @10 deg C	$6.8 \times 10^{-6}$
[K <sup>-1</sup> ] @273K	$7.1 \times 10^{-6}$
[K <sup>-1</sup> ] @373K	$7.8 \times 10^{-6}$
[K <sup>-1</sup> ] @473K	$8.3 \times 10^{-6}$
Thermal conductivity [JK <sup>-1</sup> m <sup>-1</sup> s <sup>-1</sup> ] @298K	18.0
Heat capacity [Jg <sup>-1</sup> K <sup>-1</sup> ] @298K	0.339

Optical properties	
10% transmittance limits (t=2mm),	0.5μm – 20μm
Index of refraction homogeneity	<3ppm @ 633nm
K <sup>-1</sup> @ 0.6328μm	$1.07 \times 10^{-4}$
K <sup>-1</sup> @ 1.15μm	$7.0 \times 10^{-5}$
K <sup>-1</sup> @ 3.39μm	$6.2 \times 10^{-5}$
K <sup>-1</sup> @ 10.6μm	$6.1 \times 10^{-5}$
cm <sup>-1</sup> @ 1.3μm	$5.0 \times 10^{-3}$
cm <sup>-1</sup> @ 2.7μm	$7.0 \times 10^{-4}$
cm <sup>-1</sup> @ 3.8μm	$4.0 \times 10^{-4}$

Our ZnSe crystals are grown in a proprietary process based on PVT principles. We are able to generate high quality single crystals up to 30 mm in diameter and 20mm thick. Our longtime experience in the PVT crystal growth allows us to

supply our customers with good quality product that has number of advantages properties in comparison to material received in high-pressure melt and sublimation methods that are traditionally being used for the growth of ZnSe.

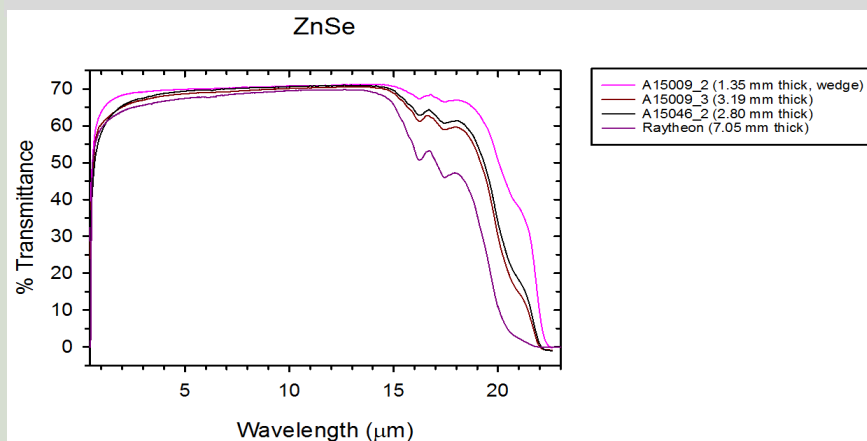
### Mechanical properties

Knoop, 50g load [kg mm <sup>-2</sup> ]	110
Vickers, 1kg load [kg mm <sup>-2</sup> ]	112
(modulus of rupture)	
4pt. loading [psi]	8 x 10 <sup>3</sup>
4pt. loading [MPa]	55
Fracture toughness (critical stress intensity factor, K <sub>IC</sub> values) [MPa m, Vickers, 100g]	0.5
[psi]	9.75 x 10 <sup>6</sup>
[GPa]	67.2
Poisson's ratio	0.28

### Physical properties

Crystal structure	cubic
SC Grain size	5-30 mm diameter
Density [g cm <sup>-3</sup> ] @298K	5.27
Resistivity [ cm]	~10 <sup>12</sup>
Chemical purity [%]	99.9996

### Transmittance Spectra ZnSe



Substance	Form	Diameter Range	Thickness Range	Transmittance Range (2-15µm)	Finish
Zinc Selenide	Multi- Crystal*	5 to 76mm**	1 to 25mm	70%	Fine Ground**
Zinc Selenide	Single Crystal	5-25 mm*	1 to 20 mm*	70%	Fine Ground*

#### \*\* Multi- Crystal

Surface Figure: 1/20 λ @10.6 µm  
 Surface Quality: 20/10 S/D, <1 nm RMS  
 Parallelism: <10arc sec  
 Custom specs available upon request

#### \*Single- Crystal

As specified by the customer