



Rocky Mountain Instrument Co.



Physical Properties

Crystal Structure	cubic
Grain Size (diameter)	50 - 70 μ m
Density (g cm ⁻³ @ 298K)	5.27
Resistivity (Ω cm)	$\approx 10^{12}$
Chemical Purity (%)	99.9996

Thermal Properties

Coefficient of Thermal Expansion	
(K ⁻¹ @ 273K)	7.1 x 10 ⁻⁶
(K ⁻¹ @ 373K)	7.8 x 10 ⁻⁶
(K ⁻¹ @ 473K)	8.3 x 10 ⁻⁶

Thermal conductivity

(JK ⁻¹ m ⁻¹ s ⁻¹ @ 298K)	18.0
---	------

Heat Capacity (Jg⁻¹K⁻¹ @ 298K) 0.339

Maximum operating temperature will depend on environment

Mechanical Properties

Hardness	Knoop, 50 gm load (kg mm ⁻²)	110
	Vickers, 1kg load (kg mm ⁻²)	112
Flexural Strength (modulus of rupture)	4 pt. Loading (psi)	8.0 x 10 ³
	4 pt. Loading (MPa)	55
	Fracture Toughness (critical stress intensity factor, K _{IC} values)	
	(MPa \sqrt m, Vickers, 100g)	0.5
Young's Modulus (elastic modulus)		
	(psi)	9.75 x 10 ⁶
	(GPa)	67.2
Poisson's Ratio		0.28

Rain erosion resistance will depend on environment

Optical Properties

10% transmission limits (t=6mm)	0.5 - 22 μ m	
Index of refraction inhomogeneity (Δ n/n)		
	(ppm @ 0.6328 μ m)	<3
Thermo-optic coefficient, dn/dT(298-358K)		
	(K ⁻¹ @ 0.6328 μ m)	1.07 x 10 ⁻⁴
	(K ⁻¹ @ 1.15 μ m)	7.0 x 10 ⁻⁵
	(K ⁻¹ @ 3.39 μ m)	6.2 x 10 ⁻⁵
	(K ⁻¹ @ 10.6 μ m)	6.1 x 10 ⁻⁵
Bulk absorption coefficient		
	(cm ⁻¹ @ 1.3 μ m)	5.0 x 10 ⁻³
	(cm ⁻¹ @ 2.7 μ m)	7.0 x 10 ⁻⁴
	(cm ⁻¹ @ 3.8 μ m)	4.0 x 10 ⁻⁴
	(cm ⁻¹ @ 5.25 μ m)	4.0 x 10 ⁻⁴
	(cm ⁻¹ @ 10.6 μ m)	5.0 x 10 ⁻⁴

Thermo-optic Coefficient, dn/dT (10⁻⁵K⁻¹) of CVD Zinc Selenide

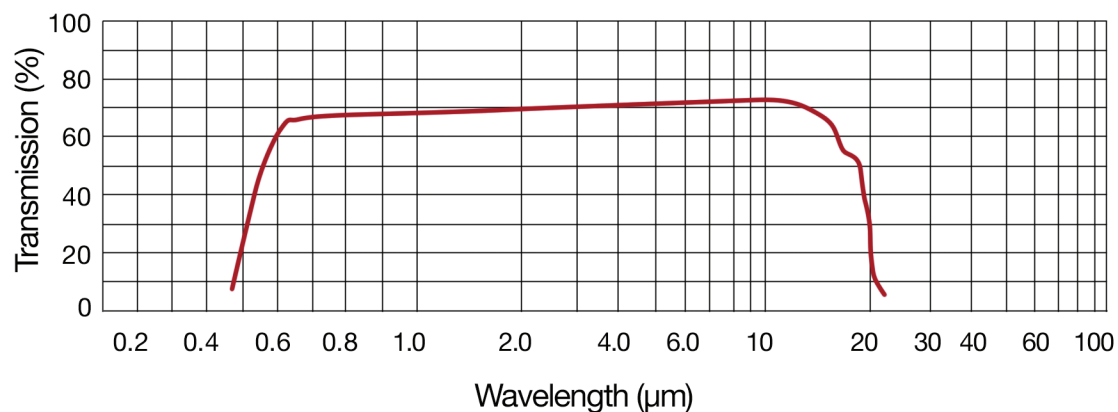
Temp °C	Wavelength (μ m)			
	0.6328	1.15	3.39	10.6
-180	7.6	5.4	5	4.9
-160	8.2	5.7	5.2	5.1
-140	8.7	6.0	5.4	5.4
-120	9.1	6.3	5.6	5.5
-100	9.4	6.5	5.8	5.7
-80	9.7	6.6	5.9	5.8
-60	10.0	6.7	6.0	5.9
-40	10.2	6.8	6.1	6.0
-20	10.3	6.9	6.1	6.0
0	10.5	7.0	6.2	6.1
20	10.6	7.0	6.2	6.1
40	10.7	7.0	6.2	6.1
60	10.8	7.1	6.3	6.1
80	10.9	7.1	6.3	6.2
100	11.0	7.2	6.3	6.2
120	11.1	7.2	6.4	6.3
140	11.3	7.3	6.4	6.3
160	11.5	7.4	6.5	6.4
180	11.8	7.6	6.6	6.6
200	12.1	7.8	6.7	6.7
σ^a	0.1	0.1	0.1	0.1

^a Standard deviation from a third degree polynomial fit





Zinc Selenide (ZnSe)



Indices of Refraction (n) of CVD Zinc Selenide as a function of wavelength at room temperature

Wavelength (μm)	Index	Wavelength (μm)	Index	Wavelength (μm)	Index	Wavelength (μm)	Index
0.54	2.68	1.8	2.45	7.4	2.42	13.0	2.39
0.58	2.63	2.2	2.44	7.8	2.42	13.4	2.38
0.62	2.60	2.6	2.44	8.2	2.42	13.8	2.38
0.66	2.58	3.0	2.44	8.6	2.41	14.2	2.37
0.70	2.56	3.4	2.44	9.0	2.41	14.6	2.37
0.74	2.54	3.8	2.43	9.4	2.41	15.0	2.37
0.78	2.53	4.2	2.43	9.8	2.41	15.4	2.36
0.82	2.52	4.6	2.43	10.2	2.41	15.8	2.36
0.86	2.51	5.0	2.43	10.6	2.40	16.2	2.35
0.90	2.50	5.4	2.43	11.0	2.40	16.6	2.35
0.94	2.50	5.8	2.43	11.4	2.40	17.0	2.34