



Chemically Vapor Deposited Zinc Selenide

CVD-ZnSe

ZnSe (Zinc Selenide) is Chemical Vapor Deposition (CVD) material produced by synthesis from Zinc vapour and H₂Se gas, forming as sheets on graphite susceptors (CVD-ZnSe process). Chemical purity of CVD-ZnSe is 99.999%. It has a polycrystalline structure; the grain size of CVD-ZnSe is controlled to produce maximal strength and machinability. The material is non-hygroscopic.

The material is grown by Elektrosteklo Ltd, Russia. VM-TIM distributes officially this material and supports customers in Europe.

We offer:

- raw material (ingots with size up to 270x500mm, thickness up to 20mm)
- blanks and shapes for a requested form
- polished and coated optical element from CVD-ZnSe
- evaporation grade of CVD-ZnSe (size less than or equal to 6 mm, purity: 99.999%)

Physical Properties of Zinc Selenide (ZnSe) CVD

Density	5.27 g/cm ³
Melting Point	1525°C (dissociates about 700°C)
Thermal Conductivity	18 W/(m K) at 298K
Thermal Expansion	7.1 x 10 ⁻⁶ /°C at 273K
Hardness Knoop, with 50 g indenter	120 kg/mm ²
Hardness Vickers, with 1 kg indenter	112 kg/mm ²
Specific Heat Capacity	339 J/(kg K)
Young's Modulus (E)	67.2 GPa
Bulk Modulus (K)	40 GPa
Apparent Elastic Limit	55.1 MPa (8,000psi)
Poisson Ratio	0.28
Resistivity	~10 ¹² (Ohm x cm)

Chemical Properties of Zinc Selenide (ZnSe) CVD

Solubility	0.001 g/100g water
Molecular Weight	144.33
Crystal Structure	polycrystalline ZnSe (CVD) Laser grade, grain size (50-70) μm

Optical properties of Zinc Selenide (ZnSe) CVD

Transmission Range	(0.5– 20) μm
Refractive Index	2.4028 at 10 μm
Reflection Loss	31.11% at 10.6 μm (2 surfaces)
dn/dT	+61 x 10 ⁻⁶ /°C at 10.6μm at 298K
dN/dμ = 0	5.5μm
Index of Absorption	0.0005 (1/cm) at 10.6 μm (Laser grade)
Pure bulk transmission (10 mm)	99.95% at 10.6 μm (Laser grade)
Transmission with AR/AR - coating	> 99.0% at 10.6 μm
Possible AR – coating range	3-12 μm

ZnSe refractive index vs wavelength

λ , μm	$n(\lambda)$	λ , μm	$n(\lambda)$	λ , μm	$n(\lambda)$
0.54	2.6754	3.0	2.4376	10.60	2.4028
0.58	2.6312	3.40	2.4356	11.40	2.3974
0.62	2.5994	3.80	2.4339	11.80	2.3945
0.66	2.5755	4.20	2.4324	12.20	2.3915
0.70	2.5568	4.60	2.4309	12.60	2.3883
0.74	2.5418	5.00	2.4295	13.00	2.3850
0.78	2.5295	5.40	2.4281	13.40	2.3816
0.82	2.5193	5.80	2.4266	13.80	2.3781
0.86	2.5107	6.20	2.4251	14.20	2.3744
0.90	2.5034	6.60	2.4235	14.60	2.3705
0.94	2.4971	7.00	2.4218	15.00	2.3665
0.98	2.4916	7.40	2.4201	15.40	2.3623
1.00	2.4892	7.80	2.4183	15.80	2.3579
1.40	2.4609	8.20	2.4163	16.20	2.3534
1.50	2.4650	8.60	2.4143	16.60	2.3487
1.80	2.4496	9.00	2.4122	17.00	2.3438
2.00	2.4460	9.40	2.4100	17.40	2.3387
2.20	2.4437	9.80	2.4077	17.80	2.3333
2.60	2.4401	10.20	2.4053	18.20	2.3278

ZnSe transmission inclusive losses because of Fresnel reflection (on both sides totally about 30%)

