

# VITRON CVD Zinc Sulfide

VITRON's polycrystalline ZnS is produced by a Chemical Vapor Deposition process (CVD). Two grades of ZnS are available:

**Regular grade (FLIR) Zinc Sulfide** is a cost-effective polycrystalline optical material and has high fracture strength. The material is used in the 7 – 12 μm band. Typical applications are windows, lenses and domes. It is available in large sizes and is moderately priced.

**Multispectral grade (CLEAR) Zinc Sulfide** is treated after growth with a special process to eliminate microscopic voids and defects which occur in the regular grade material. The material is usable in the visible to infrared region from 0.45 – 12 μm.

Classical polishing or Single-Point-Diamond-Machining enables the production of optical components with flat, spherical and/or aspherical and diffractive surfaces. Antireflection coatings can be applied to further improve the transmission.

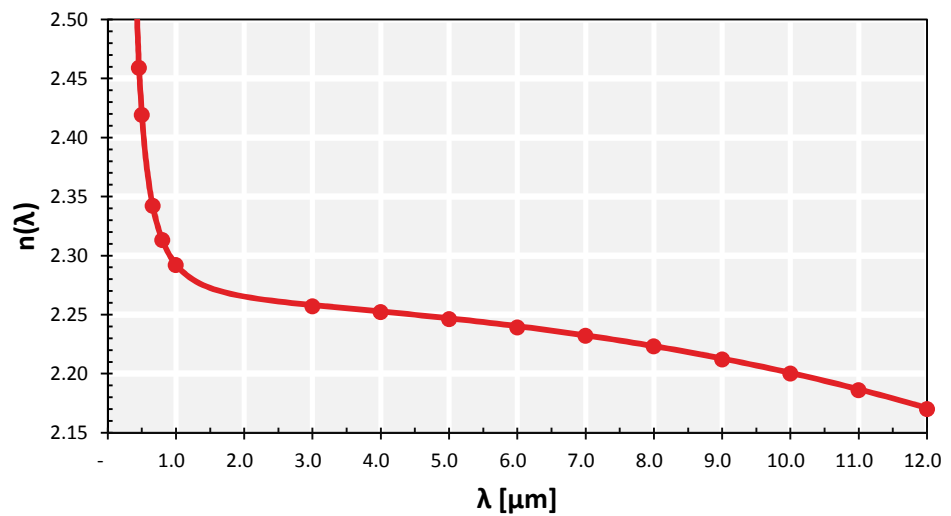


Typical delivery in form of blanks:

- ∅ 5 – 500 mm
- 5 – 500 mm
- ct 0.8 – 25 mm

## Index of Refraction (@ 20°C)

λ [μm]	n(λ)
0.46	2.459
0.50	2.419
0.66	2.342
0.80	2.313
1.00	2.292
3.00	2.257
4.00	2.252
5.00	2.246
6.00	2.239
7.00	2.232
8.00	2.223
9.00	2.212
10.00	2.200
11.00	2.186
12.00	2.170



## Sellmeier-Coefficients (@ 20°C)

A	8.39193
B <sub>1</sub>	0.14383
C <sub>1</sub>	0.24211
B <sub>2</sub>	3.28701
C <sub>2</sub>	36.71026

$$n^2(\lambda) = A + \frac{B_1}{\lambda^2 - C_1^2} + \frac{B_2}{\lambda^2/C_2^2 - 1}$$

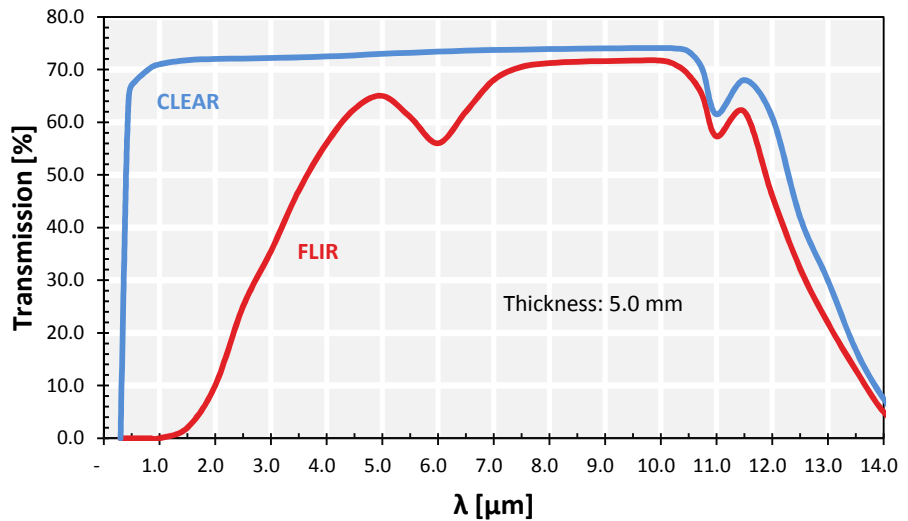
## Optical Properties

	FLIR	CLEAR
Bulk Absorption Coefficient (@ 10.6 μm)	< 0.2 x cm <sup>-1</sup>	< 0.2 x cm <sup>-1</sup>
Thermo-Optical Coefficient dn/dT	41 x 10 <sup>-6</sup> K <sup>-1</sup> (@ 10.6 μm)	54 x 10 <sup>-6</sup> K <sup>-1</sup> (@ 0.66 μm)
Refractive Index Inhomogeneity	< 100 x 10 <sup>-6</sup> (@ 10.6 μm)	< 20 x 10 <sup>-6</sup> (@ 0.66 μm)

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## Transmission

$\lambda$ [ $\mu\text{m}$ ]	FLIR [%]	CLEAR [%]
0.46	0.0	65.0
0.50	0.0	67.0
0.66	0.0	69.0
0.80	0.0	70.0
1.00	0.0	71.0
3.00	35.5	72.2
4.00	56.0	72.5
5.00	65.0	73.0
6.00	56.0	73.4
7.00	68.0	73.7
8.00	71.2	73.9
9.00	71.6	74.0
10.00	71.7	74.1
11.00	57.3	61.5
12.00	46.1	61.0



## Material Properties

	FLIR		CLEAR	
Density	4.08	$\text{g}\cdot\text{cm}^{-3}$	4.09	$\text{g}\cdot\text{cm}^{-3}$
Thermal Expansion (@ 20°C)	6.8	$\times 10^{-6} \text{K}^{-1}$	6.5	$\times 10^{-6} \text{K}^{-1}$
Specific Heat Capacity	0.469	$\text{J}\cdot\text{g}^{-1}\cdot\text{K}^{-1}$	0.527	$\text{J}\cdot\text{g}^{-1}\cdot\text{K}^{-1}$
Thermal Conductivity	16.7	$\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$	27.2	$\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
Young's Modulus	74	GPa	88	GPa
Modulus of Rupture	103	MPa	69	MPa
Poisson's Ratio	0.27		0.27	
Hardness (Knoop)	210-240	$\text{Kg}\cdot\text{mm}^2$	150-165	$\text{Kg}\cdot\text{mm}^2$

## Chemical Properties

VITRON's CVD Zinc Sulfide is chemical inert and not hygroscopic. It is resistant to highly reactive atmospheric gases.

## Typical Forms of Supply

Semi-finished: Cut To Size Blanks (CTS), Sufficient Material To Yield (SMTY), Generated Lens Blanks  
Other shapes by customer request

Optical components: Windows, Lenses, Prisms and other optical parts according to customer specification  
AR/AR coatings on customer request

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**VITRON**  
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