

Zinc Sulphide Multispectral (ZnS)

MATERIALS DATA

Zinc Sulphide is produced by synthesis from Zinc vapour and H₂S gas, forming as sheets on a graphite substrate. Zinc Sulphide is microcrystalline in structure, the grain size being controlled to produce maximum strength. Multispectral grade is then Hot Isostatically Pressed (HIP) to improve the mid IR transmission and produce the visibly clear form. Single crystal ZnS is available, but is not common.

APPLICATIONS: ZnS Multispectral (water-clear) is used for IR windows and lenses in the thermal band (8 to 14µm) where maximum transmission and lowest absorption is required. Also selected for use where visible alignment is an advantage.

Transmission Range	0.37 to 13.5µm
Refractive Index	2.20084 at 10µm
Reflection Loss	24.7% at 10µm (2 surfaces)
Absorption Coefficient	0.0006 cm ⁻¹ at 3.8µm
Reststrahlen Peak	30.5µm
dn/dT	+38.7 x 10 ⁻⁶ K ⁻¹ at 3.39µm
dn/dµ = 0	n/a
Density	4.09 g/cc
Melting Point	1827°C *See notes below
Thermal Conductivity	27.2 W m ⁻¹ K ⁻¹ at 298K
Thermal Expansion	6.5 x 10 ⁻⁶ K ⁻¹ at 273K
Hardness	Knoop 240 with 50g indenter
Specific Heat Capacity	515 J Kg ⁻¹ K ⁻¹
Dielectric Constant	88
Youngs Modulus (E)	74.5 GPa
Shear Modulus (G)	n/a
Bulk Modulus (K)	n/a
Elastic Coefficients	Not Available
Apparent Elastic Limit	68.9 MPa (10,000 psi)
Poisson Ratio	0.28
Solubility	65 x 10 ⁻⁶ g/100g water
Molecular Weight	97.43
Class/Structure	HIP polycrystalline cubic, ZnS, F42m

** Zinc Sulphide oxidizes significantly at 300°C, exhibits plastic deformation at about 500°C and dissociates about 700°C. For safety, Zinc Sulphide windows should not be used above 250°C in normal atmosphere.*



Zinc Sulphide Multispectral (ZnS)

MATERIALS DATA

μm	No	μm	No	μm	No
0.4047	2.54515	0.4358	2.48918	0.4678	2.44915
0.480	2.43691	0.5086	2.41279	0.5461	2.38838
0.5876	2.36789	0.6438	2.34731	0.6678	2.34033
0.7065	2.33073	0.780	2.31669	0.7948	2.31438
0.8521	2.30659	0.8943	2.30183	1.014	2.29165
1.1287	2.28485	1.5296	2.27191	2.0581	2.26442
3.000	2.25772	3.500	2.25498	4.000	2.25231
4.500	2.24955	5.000	2.24661	8.000	2.22334
9.000	2.22334	10.00	2.20084	11.25	2.18317
12.00	2.17101	13.00	2.15252		

