

Zinc Sulphide Multispectral (ZnS)

Specialist Data Sheet

Product Name	Zinc Sulphide Multispectral (ZnS)
Transmission Range	0.37 ~ 13.5 μm
Refractive Index	2.20084 @ 10 μm
Reflection Loss	24.7% @ 10 μm (2 surfaces)
Absorption Coefficient	0.0006 cm^{-1} @ 3.8 μm
Reststrahlen Peak	30.5 μm
dN/dT	+38.7 x 10 ⁻⁶ /°C @ 3.39 μm
dN/du	n/a
Density	4.09 g/cc
Melting Point	1827 °C (see notes below)
Thermal Conductivity	27.2 W m ⁻¹ K ⁻¹ @ 298K
Thermal Expansion	6.5 x 10 ⁻⁶ /°C @273K
Hardness	Knoop 160 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 (10000 psi)
Poisson Ratio	0.29
Solubility	65 x 10 ⁻⁶ g/ 100g water
Molecular Weight	97.43
Class/Structure	HIP polycrystalline cubic, ZnS, F42m

Notes:

Zinc Sulphide is produced by synthesis from zinc vapour and H₂S gas, forming as sheets on graphite susceptors. It 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.

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

Application:

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



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

Transmission Range Graph:

