AMERICAN PHOTONICS

MATERIAL DATASHEET

Zinc Selenide (ZnSe)

CVD ZnSe — the workhorse of CO_2 laser power delivery and broadband IR imaging.

PHYSICAL PROPERTIES	
Crystal structure	Cubic zincblende (CVD polycrystalline)
Density	5.27 g/cm^3
Grain size	< 100 µm typical
Inclusions	None > 0.05 mm (laser grade)
Bulk resistivity	> 10^{12} Ω·cm
OPTICAL PROPERTIES	
Useful transmission range	0.6 – 16 µm
Refractive index	2.403 @ 10.6 µm
Bulk absorption @ 10.6 µm	< 0.0005 cm^{-1} (laser grade)
dn/dT @ 10.6 µm	+61 × 10^{-6}/K
Index inhomogeneity @ 633 nm	< 3 × 10^{-6}
THERMAL PROPERTIES	
Thermal conductivity	18 W/m·K
Specific heat	0.356 J/g·K
Thermal expansion (CTE)	7.6 × 10^{-6}/K
MECHANICAL PROPERTIES	
Young's modulus	67.2 GPa
Rupture modulus	55.1 MPa
Knoop hardness	105 – 120 kgf/mm^2
Poisson's ratio	0.28
Fracture toughness	~0.5 MPa·m$^{0.5}$

Typical Applications

CO_2 laser focusing lenses, windows, output couplers and beamsplitters; multispectral FLIR optics; broadband IR windows with visible see-through for alignment.

Fabrication & Specification Notes

Lowest bulk absorption of practical CO_2 materials — minimum thermal lensing at multi-kW power. Soft (Knoop ~120): specify DLC or hard AR coatings for harsh environments. Non-hygroscopic and chemically stable.