

OPTICAL MATERIALS : INFRA-RED

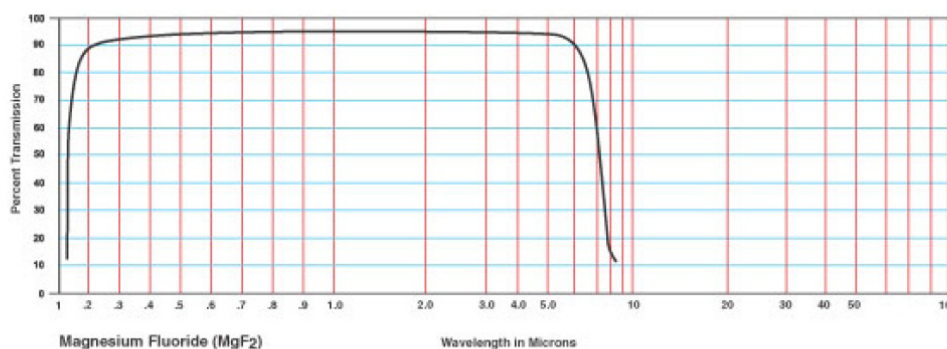
Title: Optical material/ crystals (Infrared)

Material/Specification: Magnesium Fluoride for 0.12 μ m to 7 μ m transmission

Range/Description: OPMI-MAGNESIUM FLUORIDE

Magnesium fluoride is transparent over an extremely wide range of wavelengths. Windows, lenses and prisms made of this material can be used over the entire range of wavelengths from 0.120 μ m vacuum (UV) to 8.0 μ m (IR). Good structure synthetic VUV grade MgF₂ is quite expensive, in the region of \$3000/kg (2007) but the real cost of optics in this material is due to relatively low volume manufacture. Thin layers of MgF₂ are frequently applied to the surfaces of optical elements as part of optical coatings such as

Internal Transmittance



Internal Transmittance $\tau_i(\lambda)$ vs. wavelength λ										
$\lambda, \mu\text{KM}$	0.2	0.5	1.0	3.0	5.0	6.0	7.0	8.0	---	---
$\tau_i(\lambda)$	0.95	0.97	0.97	0.97	0.97	0.91	0.54	0.12	---	---

Refractive Index n vs. Wavelength λ <i>no=Ordinary ne=extraordinary</i>													
$\lambda, \mu\text{KM}$	0.2	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	---	---	---	---
no	1.42	1.37	1.37	1.36	1.36	1.35	1.34	1.32	1.30	---	---	---	---
ne	1.43	1.39	1.38	1.37	1.37	1.36	1.34	1.33	1.31	---	---	---	---

Optical Properties	
Transmission Range	0.12 to 7 μ m
Refractive Index	1.413 at 0.22 μ m
Refractive Loss	5.7% at 0.22 μ m
Crystal/Class Structure	Tetragonal
Cleavage Plane	(100),(110), imperfect

Thermal Properties	
Thermal Expansion	13.7 (para) 8.9 (perp) $\times 10^{-6} / \text{K}$
Thermal Conductivity	21 (para) 33.6 (perp) $\text{W m}^{-1} \text{K}^{-1}$ at 300K
Melting Point	1255 $^{\circ}\text{C}$
Specific Heat Capacity	1003 $\text{J Kg m}^{-1} \text{K}^{-1}$

Mechanical Properties	
Density	3.18g/cc
Hardness (Knoop)	415
Youngs Modulus	138 GPa
Shear Modulus	54.66GPa
Bulk Modulus	101.32 GPa
Poisson Ratio	0.276
Elastic Limit	49.6 GPa (7200 psi)
Molecular Weight	62.32

Chemical Properties	
Solubility	0.0002g/100g water

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