



Engineering Better Material Solutions

ALON[®] Optical Ceramic

Technical Data

ALON[®] Optical Ceramic is an extremely durable crystalline material with excellent optical transparency in the near ultraviolet, visible and infrared up to approximately 5 μm wavelength.

The material combines mechanical and optical properties similar to sapphire with the advantages of an isotropic cubic crystal structure. It has an approximate composition of $\text{Al}_{23}\text{O}_{27}\text{N}_5$.

ALON[®] Optical Ceramic can be made to order as windows, domes, plates, rods and tubes in a wide range of sizes and thicknesses by a variety of conventional ceramic forming methods such as injection molding, isostatic pressing and slip casting. **ALON[®] Optical Ceramic** is fabricated using a proprietary powder processing technique.

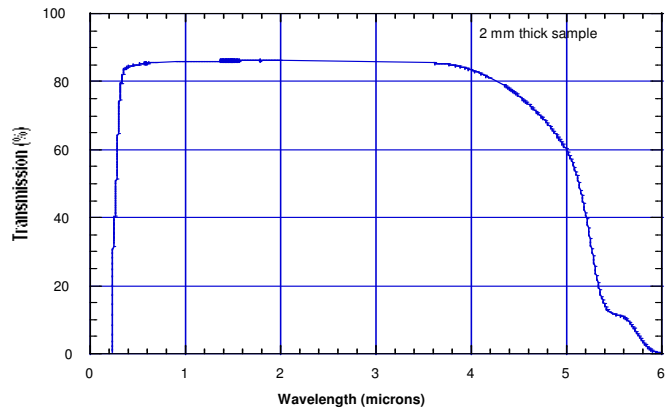


Composition	$\text{Al}_{23-1/3X}\text{O}_{27+X}\text{N}_{5-X}$, ($0.429 < X < 2$)
Average Grain Size	200-300 microns
Structure	Cubic, Spinel
Lattice Constant	7.956–7.936 Å
Density	3.69 g/cc
Form	Polycrystalline
Melting Point	2150°C
Young's Modulus	320 GPa
Shear Modulus	135 GPa
Poisson's Ratio	0.24
Hardness	1800±100 kg/mm ² (Knoop indentation, 200g load)
Fracture Toughness	2.0MPa·m ^{1/2}
Flexure Strength	300-700 MPa*
Specific Heat	0.22 cal/g°C
Thermal Conductivity	~12.6 W/mK (25°C)
Transmission Limits	0.22 to 6 microns

*varies depending on surface finish

Dielectric Properties		
f (GHz)	k	tan δ ($\times 10^{-5}$)
35-45	9.190	31
55-60	9.181	67
90-110	9.175	96

Thermal Expansion Coeff.	
T(°C)	TCE ($\times 10^{-6}$)
30-200	5.65 $\times 10^{-6}$
30-400	6.40 $\times 10^{-6}$
30-600	6.93 $\times 10^{-6}$
30-900	7.50 $\times 10^{-6}$



Index of Refraction	
$\lambda(\mu\text{m})$	n
0.48	1.803
0.50	1.801
0.64	1.790
0.68	1.788
0.7	1.787
1.00	1.779
2.00	1.761
3.00	1.737
4.00	1.702
5.00	1.653

IR Absorption Coefficient	
$\lambda(\mu\text{m})$	α (cm^{-1})
3.800	0.080
4.000	0.159
4.230	0.288
4.545	0.598
4.717	0.849
4.902	1.230
5.000	1.598
5.102	2.000
5.319	5.230
5.550	8.060

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