

# ALON®

## TECHNICAL DATA

## ALON® Optical Ceramic

*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.

*ALON® Optical Ceramic* is fabricated using a proprietary powder processing technique. 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 Al<sub>23</sub>O<sub>27</sub>N<sub>5</sub>.

*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 slipcasting.



## TYPICAL PROPERTIES OF ALON® OPTICAL CERAMIC

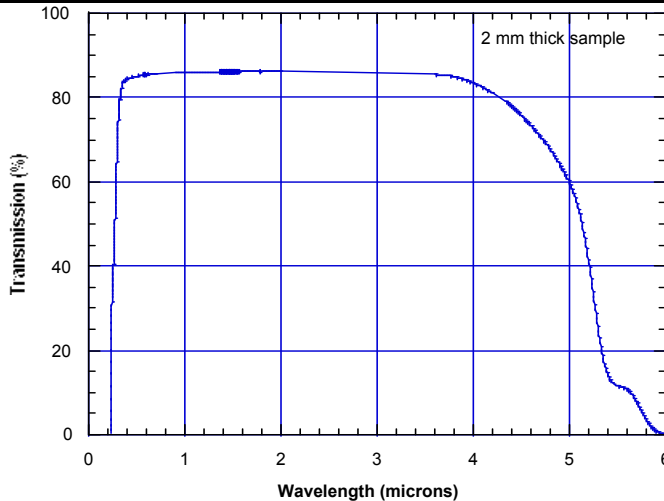
Composition.....	Al <sub>23-1/3X</sub> O <sub>27+X</sub> N <sub>5-X</sub> (0.429<X<2)
Grain Size (typical).....	150-250 microns
Structure.....	Cubic, Spinel
Lattice Constant.....	7.956Å – 7.936Å
Density.....	3.696 – 3.691 g/cc
Form.....	Polycrystalline
Melting Point.....	2150°C
Young's Modulus.....	46.9x10 <sup>6</sup> psi
Shear Modulus.....	18.9x10 <sup>6</sup> psi
Poisson's Ratio.....	0.24
Hardness.....	1850 Kg/mm <sup>2</sup> (Knoop Indentation, 200g load)
Fracture Toughness.....	2.0 MPa-m <sup>1/2</sup>
Flexure Strength.....	55,000 psi
Specific Heat.....	0.22 cal/g-°C
Thermal Conductivity	(cal/cm-s-°C)
	75°C..... 0.023
	270°C..... 0.017
	540°C..... 0.015
	830°C..... 0.017
Transmission Limits	0.22 to 6 microns

**Thermal Expansion Coeff.**

30-200°C	5.65x10 <sup>-6</sup>
30-400°C	6.40x10 <sup>-6</sup>
30-600°C	6.93x10 <sup>-6</sup>
30-900°C	7.50x10 <sup>-6</sup>

**Dielectric Properties**

Freq. (GHz)	k	tan δ (x10 <sup>-5</sup> )
35-45	9.190	31
55-60	90181	67
90-110	9.175	96



**Index of Refraction**

λ(μm)	n
0.48	1.803
0.50	1.801
0.64	1.790
0.68	1.788
0.70	1.787
1.00	1.779
2.00	1.761
3.00	1.737
4.00	1.702
5.00	1.653

**Infrared**

**Absorption Coefficient**

λ(μm)	α (cm <sup>-1</sup> )
3.8	0.080
4.000	0.159
4.230	0.288
4.380	0.409
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
5.814	11.030