

Mateck Sapphire (Al2O3)

Category : Ceramic , Oxide , Aluminum Oxide

Material Notes:

Optical crystals

Order this product through the following link:

http://www.lookpolymers.com/polymer_Mateck-Sapphire-Al2O3.php

Physical Properties	Metric	English	Comments
Density	3.98 g/cc	0.144 lb/in ³	
a Lattice Constant	4.758 Å	4.758 Å	
c Lattice Constant	12.991 Å	12.991 Å	
Molecular Weight	101.96 g/mol	101.96 g/mol	

Mechanical Properties	Metric	English	Comments
Vickers Microhardness	1940	1940	MPa
	2200	2200	MPa
Hardness, Mohs	9.0	9.0	
Modulus of Elasticity	426.4 GPa	61850 ksi	parallel to c-axis
	462.6 GPa	67100 ksi	perpendicular to c-axis
Poissons Ratio	0.309	0.309	
Shear Modulus	144.3 GPa	20930 ksi	perpendicular to c-axis
	162.9 GPa	23630 ksi	parallel to c-axis

Thermal Properties	Metric	English	Comments
CTE, linear	3.24 - 5.66 µm/m-°C	1.80 - 3.14 µin/in-°F	perpendicular to c-axis
	@Temperature -60.0 - 60.0 °C	@Temperature -76.0 - 140 °F	
Specific Heat Capacity	0.761 J/g-°C	0.182 BTU/lb-°F	
Thermal Conductivity	23.1 W/m-K	160 BTU-in/hr-ft ² -°F	parallel to c-axis
	@Temperature 46.0 °C	@Temperature 115 °F	
	25.2 W/m-K	175 BTU-in/hr-ft ² -°F	perpendicular to c-axis
	@Temperature 46.0 °C	@Temperature 115 °F	

Thermal Properties	2030 °C Metric	3690 °F English	Comments
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Optical Properties	Metric	English	Comments
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Refractive Index	1.7771	1.7771	at ne
	1.6679	1.6679	
	@Wavelength 4000 nm	@Wavelength 4000 nm	
	1.6748	1.6748	
	@Wavelength 4000 nm	@Wavelength 4000 nm	
	1.692	1.692	
	@Wavelength 3000 nm	@Wavelength 3000 nm	
	1.7015	1.7015	
	@Wavelength 3000 nm	@Wavelength 3000 nm	
	1.746	1.746	
	@Wavelength 1000 nm	@Wavelength 1000 nm	
	1.7545	1.7545	
	@Wavelength 1000 nm	@Wavelength 1000 nm	
Transmission, Visible	97 %	97 %	Internal Transmittance
	@Wavelength 500 nm	@Wavelength 500 nm	
IR Transmittance	45 %	45 %	Internal Transmittance
	@Wavelength 5000 nm	@Wavelength 5000 nm	
	97 %	97 %	Internal Transmittance
	@Wavelength 1000 nm	@Wavelength 1000 nm	
	97 %	97 %	Internal Transmittance
	@Wavelength 3000 nm	@Wavelength 3000 nm	
UV Transmittance	79 %	79 %	Internal Transmittance
	@Wavelength 200 nm	@Wavelength 200 nm	

Descriptive Properties	Value	Comments
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Cleavability	(1011)	imperfect
	(1120)	
Constants of Elastic Compliance (Pa ⁻¹)	2.2E-12	S33

Descriptive Properties	Value	Comments
	4E-13	S13
	5E-13	S14
	-6.8E-12	S44
	-7E-13	S12
Symmetry Class	3m	
Syngony	tetragon	
Thermal Coefficient of Refractive Index	8.8E-6 to 1.28E-5	β_0 at 3.39 microns for $\pm 60^\circ\text{C}$
	9.9E-6 to 1.39E-5	β_e at 3.39 microns for $\pm 60^\circ\text{C}$
Thermal Stability, $^\circ\text{C}$	162 \pm 8	
Transmission Range (microns)	0.17 - 5	

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