

Crystallographic Al2O3 (Sapphire)

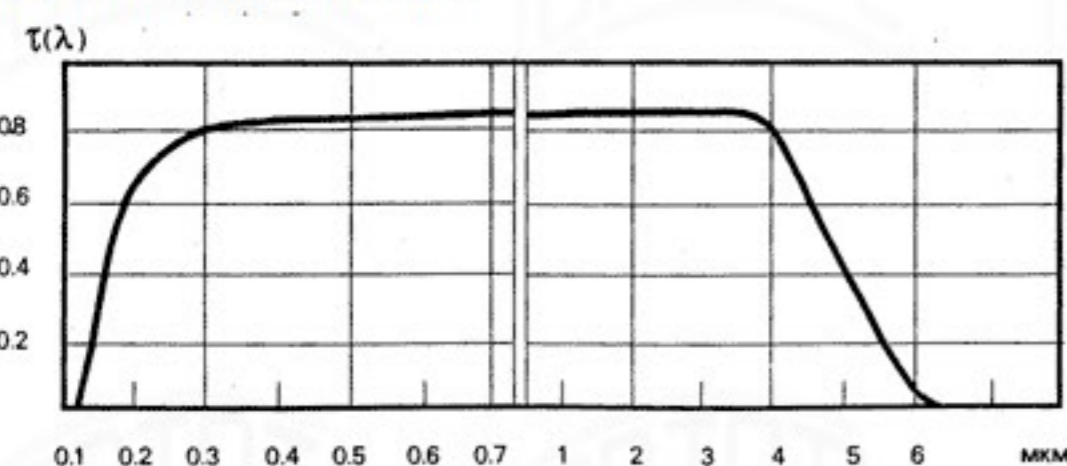
Syngony	Tetragon
Symmetry Class	3m
Lattice Constants, Angstroms	a=4.758 c=12.991
Cleavability	(1011),(1012), imperfect

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Optical Al2O3 (Sapphire)

Refractive Index at n_e		1.7771
Refractive Index, $n_F - n_C$	n_o	0.0107
Thermal Coefficient of Refractive Index at $l=0.46$ microns, $^{\circ}C^{-1}$ for $\pm 60^{\circ}C$	b_o	$(0.88, 1.28) \cdot 10^{-5}$
	b_e	$(0.99, 1.39) \cdot 10^{-5}$
Transmission Range, microns (thickness 10MM)		0.17 ,5.0

Transmittance $t_i(l)$ vs. wavelength l



Internal Transmittance $t_i(l)$ vs. wavelength l	
l, MKM	$t_i(l)$
0.2	0.79
0.5	0.97
1.0	0.97
3.0	0.97
5.0	0.45

Refractive Index n vs. wavelength l	
l, MKM	n_o/n_e
0.2	
0.5	
1.0	1.7545 1.7460
2.0	1.7374 1.7299
3.0	1.7015 1.6920
4.0	1.6748 1.6679

Thermal Al2O3 (Sapphire)

Thermal Linear Expansion $a_t, ^{\circ}C^{-1}$ for $\pm 60^{\circ}C$	\wedge to c-axis	$(3.24-5.66) \cdot 10^{-6}$
Thermal Conductivity, $W/(m \cdot ^{\circ}C)$ at $26^{\circ}C$	// to c-axis	25.2
	\wedge to c-axis	23.1
Specific Heat Capacity, $J/(kg \cdot ^{\circ}C)$ at $18^{\circ}C$		761
Thermal Stability, $^{\circ}C$		162 \pm 8
Melting Point, $^{\circ}C$		2030

Mechanical Al2O3 (Sapphire)

Density, g/cm^3 at $20^{\circ}C$		3.98
Mohs Hardness		9
Vickers Microhardness, Pa	\wedge to c-axis	$2200 \cdot 10^7$
	// to c-axis	$1940 \cdot 10^7$
Constants of Elastic Compliance, Pa^{-1}	S_{11}	$2.3 \cdot 10^{-12}$
	S_{12}	$-0.7 \cdot 10^{-12}$
	S_{13}	$-0.4 \cdot 10^{-12}$
	S_{33}	$2.2 \cdot 10^{-12}$
	S_{44}	$6.8 \cdot 10^{-12}$
	S_{14}	$0.5 \cdot 10^{-12}$
Poisson Ratio	// to c-axis	0.309
Young Modulus (E), Pa	// to c-axis	$46.26 \cdot 10^{10}$
	\wedge to c-axis	$42.64 \cdot 10^{10}$
Shear Modulus (G), Pa	// to c-axis	$14.43 \cdot 10^{10}$
	\wedge to c-axis	$16.29 \cdot 10^{10}$

Chemical Al2O3 (Sapphire)

Solubility Al2O3 (Sapphire)	
in water at $20^{\circ}C$ $g/100cm^3$	in acids
$98 \cdot 10^{-6}$	-