

Sapphire (Al₂O₃)

Sapphire (as known as white sapphire, molecular formula (Al₂O₃) single crystal is an excellent multifunctional material. It has high temperature resistance, good thermal conductivity, high hardness, infrared transmission and good chemical stability. It is widely used in many fields of industry, national defense and scientific research (such as high-temperature infrared windows, etc.). At the same time, it is also a widely used single crystal substrate material, and it is the first choice for the blue, violet, and white light emitting diode (LED) and blue laser (LD) industries. And it is also an important superconducting film substrate. In addition to making Y-series, La-series and other high-temperature superconducting films, it can also be used to grow new practical MgB₂ superconducting films.



PARAMETERS

Crystal Structure	Hexagonal		
Lattice Constant	a=4.748Å, c=12.97Å		
Density	3.98 (g/cm ³)		
Melt Point	2040°C		
Growth Method	Czochralski, Kyropoulos		
Mohs Hardness	9 (mohs)		
Refractive Index	300K, //c, 1.762 @630nm ⊥c, 1.770 @630nm		
Thermal Expansion	5.8 × 10 ⁻⁶ /K		
Thermal Conductivity (W/mK)	⊥c	//c	
	23°C, 55	26°C, 60	
	77°C, 40	70°C, 41	
Loss Tangent at 293K	1×10 ⁻⁴ (1MHz)		
Dielectric Constant at 10 ³ -10 ⁹ Hz @25°C	//c, 11.5 ⊥c, 9.3		
Transmittance	80% @ 400~4000nm		
Orientation	A-plane	<11-20>	2.379 Å
	R-plane	<1-102>	1.740 Å
	M-plane	<10-10>	1.375 Å
	C-plane	<0001>	2.165 Å
Crystallographic Orientation Tolerance	±0.5°		
Regular Size and Tolerance	10×3mm, 10×5mm, 10×10mm, 15×15mm, 20×15mm, 20×20mm		
Regular Thickness and Tolerance	0.5mm, 1.0mm		

Polishing	One side or two sides
Surface Roughness	Ra<5Å (5×5μm)
Package	Class 100 clean bag, Class 1000 super clean room