GROUP	PROPERTY / ATTRIBUTE	VALUE
General	Chemical Formula	Al_2O_3
	Crystal Shape, Class	Trigonal, hexagonal-scalenohedral
Sapphire's crystal structure is the source of its extreme strength, hardness and optical properties. When aligned, monocrystallinity is achieved with three (3) planes: C, M & R		
Physical / Mechanical	Density	3.97 gm/cm^3
	Shear Modulus (Modulus of Rigidity)	175 GPa (26 x 106 psi)
	Flexural Strength	1035 MPa (150kpsi) parallel to C-axis (25°C)
		760 MPa (110kpsi) perpendicular to C-axis (25°C)
	Hardness	9 on MOHS scale (Diamond is 10)
With strength and stiffness 6 times higher than quartz, combined with excellent wear and scratch resistance, sapphire becomes the high performance choice.		
Thermal	Usable Temperature	2000 C
	Thermal Conductivity	0.4 watts/cm °K (25°C)
		0.1 watts/cm °K (1000°C)
	Coefficient of Thermal Expansion (25 - 1000 C)	8.8 x 10^{-6} parallel to C-axis
		7.9 x 10^{-6} perpendicular to C-axis
Sapphire's high melting point and thermal conductivity make it ideal for substrates and wafers for epitaxial growth.		
Electrical	Dielectric Strength	480,000 Volts/cm (1200v/mil)
	Dielectric Constant	11.5 (103 - 109 Hz, 25°C) parallel to C-axis
		9.3 (103 - 109 Hz, 25°C) perpendicular to C-axis
Sapphire provides a high, stable dielectric constant with the electrical insulation required for electronic substrates, RF and microwave transmitting windows and tubes.		
Optical	Transmittance Range	200 µm to 3500 nm
	Transmission Level	> 80%
	Birefringence	0.008 (No-Ne); eliminated along C ('optical') axis
With transmission from 200 to over 3500 nm, sapphire is used in applications requiring from UV though VIS to short wave IR (SWIR).		

To see full specifications, click here