Sapphire

Al_2O_3 (Sapphire crystal) is the known hardest oxide crystal, covering 0.17-5.5um wave range. For it has high strength at high temperatures, good thermal properties, excellent transparency and chemically resistant to common acids and alkali, Al_2O_3 is widely used in demanding environment where good transmission is needed from the visible to the near infrared wave range.

Optical properties	
Refractive Index	1.75449 (o) 1.74663 (e) at 1.06um
Reflection Loss	14% at 1.06um (2 surfaces)
Absorption Coefficient	0.3 x 10^{-3}e cm^{-1} at 2.4μm
Restrahlen Peak	13.5μm
dN/dT	13.7 x 10^{-6}e at 5.4μm
dN/dμ = 0	1.5μm
Physical properties	
Density	3.97 g/cm^3
Melting Point	2040℃
Thermal Conductivity	27.21 W/(m*K) at 300K
Thermal Expansion	5.6 (paral) & 5.0 (perp) x 10^{-6}e/K *
Hardness	Knoop 2000 with 2000g indenter
Specific Heat Capacity	419 J/(kg K)
Dielectric Constant	11.5 (paral) 9.4 (perp) at 1MHz
Young's Modulus (E)	335 GPa
Shear Modulus (G)	148.1 GPa
Bulk Modulus (K)	240 GPa
Elastic Coefficients	C11=496 C12=164 C13=115 C33=498 C44=148
Apparent Elastic Limit	275 MPa (40,000 psi)
Poisson Ratio	0.25
Chemical properties	
Solubility	98x10^{-5} g/100g water
Molecular Weight	101.96
Class/Structure	Trigonal (hex), R3c

Refractive index

λ(μm)	0.325	0.458	0.532	0.670	0.780	0.820	0.980	1.064	1.550	2.010
Nd(O ray)	1.805	1.778	1.772	1.764	1.761	1.760	1.756	1.754	1.746	1.737
Nd(E ray)	1.796	1.770	1.764	1.756	1.753	1.7528	1.748	1.747	1.738	1.729
λ(μm)	2.249	2.703	2.942	3.333	3.704	4.000	4.348	4.762	5.000	5.263
Nd(O ray)	1.732	1.719	1.712	1.701	1.687	1.674	1.658	1.636	1.623	1.607
Nd(E ray)	1.724	1.711	1.704	1.693	1.699	1.666	1.650	1.628	1.615	1.599