

Rutile (TiO₂)

MATERIALS DATA

Rutile is grown by the Czochralski method typically up to 25mm diameter and up to 80mm long.

APPLICATIONS: Rutile is a high index material used mainly for optical coupling prisms and also as substrates for epitaxial growth.

Transmission Range	0.43 to 5.0 μ m
Refractive Index	No 2.555 at 0.69 μ m (1)(2)
Reflection Loss	30% at 2 μ m (2 surfaces)
Absorption Coefficient	n/a
Reststrahlen Peak	n/a
dn/dT	n/a
dn/d μ = 0	2.81 μ m
Density	4.252 g/cc
Melting Point	1840°C
Thermal Conductivity	12.5 (para) 8.7 (perp) W m ⁻¹ K ⁻¹
Thermal Expansion	9.2 (para) 7.1 (perp) x 10 ⁻⁶ /°C
Hardness	Knoop 879 with 500g indenter
Specific Heat Capacity	711 J kg ⁻¹ K ⁻¹
Dielectric Constant	160 at 1 MHz
Youngs Modulus (E)	n/a
Shear Modulus (G)	n/a
Bulk Modulus (K)	n/a
Elastic Coefficients	C ₁₁ =269;C ₁₂ =177;C ₁₃ =146;C ₃₃ =480;C ₄₄ =124
Apparent Elastic Limit	4.8 MPa (700 psi)
Poisson Ratio	0.28
Solubility	Insoluble in water
Molecular Weight	79.9
Class/Structure	Tetragonal, P42/mnm, (#136) Rutile Structure.

(1) Handbook Optical Constants, ed Palik, V1, ISBN 0-12-544423-6

(2) Shenoy; 1EE Poceedings-J, Vol. 139, No. 2, Apr 1992



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μm	No	Ne	μm	No	Ne
0.436	2.853	3.216	0.492	2.725	3.051
0.496	2.718	3.042	0.546	2.652	2.958
0.577	2.623	2.921	0.579	2.621	2.919
0.589	2.616	2.903	0.691	2.555	2.836
0.708	2.548	2.826	1.01	2.484	2.747
1.530	2.454	2.710	2.42	2.40	2.59
3.38	2.41	2.58	3.79	2.39	2.57
4.28	2.34	2.51	4.89	2.32	2.49
5.73	2.24	2.43			

