Barium Fluoride (BaF_2)

MATERIALS DATA

Barium Fluoride is grown by vacuum Stockbarger technique. Unlike CaF2, BaF2 is not found in the native state and all material must be synthesised chemically making BaF2 relatively expensive to produce. Barium Fluoride cleaves easily and is highly susceptible to thermal shock. It polishes well and can be etched (5). The highest purity VUV material can be qualified as fast scintillator grade.

APPLICATIONS: Barium Fluoride is used in spectroscopic components. It is often suitable for applications in the passive IR band (8 to 14µm) and is often used as a view-port window for thermography. For an equivalent thickness the transmission extends approximately 1µm further into the IR than CaF2. The highest quality BaF_2 also has application as the fastest known scintillator material and is used in High Energy Physics Experiments.

Transmission Range	0.15 to 12µm
Refractive Index	1.45 at 5µm (1)
Reflection Loss	6.5% at 5µm (2 surfaces)
Absorption Coefficient	3.2×10^{-4} cm^{-1} @ 6µm
Reststrahlen Peak	47 µm
dn/dT	-15.2×10^{-6}/°C (2)
dn/dµ = 0	1.95µm
Density	4.89 g/cc
Melting Point	1386°C
Thermal Conductivity	11.72 W m^{-1} K^{-1} @ 286 K
Thermal Expansion	18.1×10^{-6} K^{-1} @ 273 K
Hardness	Knoop 82 with 500g indenter (4)
Specific Heat Capacity	410 J Kg^{-1} K^{-1} (3)
Dielectric Constant	7.33 at 1 MHz
Youngs Modulus (E)	53.07 GPa (3)
Shear Modulus (G)	25.4 GPa (3)
Bulk Modulus (K)	56.4 GPa
Elastic Coefficients	C_{11} = 89.2 C_{12} = 40.0 C_{44} = 25.4 (2)
Apparent Elastic Limit	26.9 MPa (300psi) (4)
Poisson Ratio	0.343
Solubility	0.17g/100g water at 23°C
Molecular Weight	175.36
Class/Structure	Cubic $Fm\bar{3}m$ (#225) Fluorite structure Cleaves on (111)

(1) Handbook Optical Constants, ed Palik, V3, ISBN 0-12-544423-0
(2) I.H.Malitson; J.Opt.Soc.Am. Vol52, p1377, 1962
(3) D.Girlich; Elastic Constants of BaF2; Phys.Rev. Vol135, p1826, 1964
(4) S.Ballard et al; J.Opt.Soc.Am. Vol42, p684, 1952
(5) US patent. Chemical polish. 4,040,896 1977
(6) M.Laval et al; Nu. Insts.Meth, V206 p169, 1983

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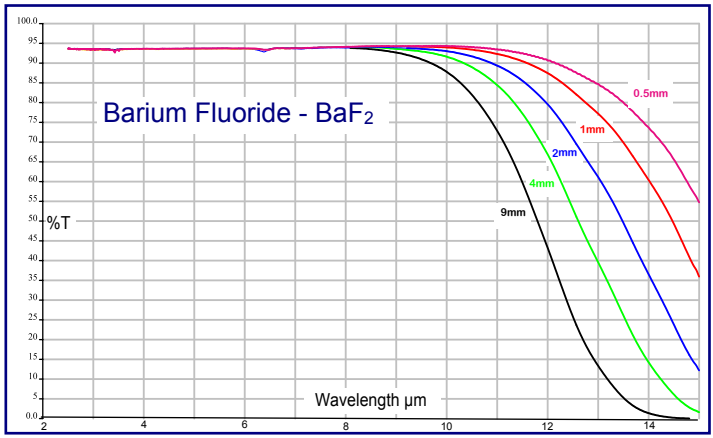
µm	No	µm	No	µm	No
0.1408	1.815	0.1452	1.7820	0.1477	1.7670
0.1500	1.6780	0.2000	1.557	0.2652	1.5122
0.2803	1.5066	0.2893	1.5039	0.2967	1.5019
0.3021	1.5004	0.3130	1.4978	0.3254	1.4952
0.3403	1.4925	0.3466	1.4915	0.3610	1.4894
0.3663	1.4887	0.4046	1.4844	0.5461	1.4759
0.5893	1.4744	0.6438	1.4730	0.6563	1.4727
0.7065	1.4718	0.8521	1.4699	0.8944	1.4694
1.0140	1.4685	1.1287	1.4678	1.3673	1.4667
1.5295	1.4661	1.6810	1.4656	1.7012	1.4655
1.9701	1.4647	2.3254	1.4636	2.6738	1.4623
3.2434	1.4602	3.4220	1.4594	5.1380	1.4501
5.5490	1.44732	6.2380	1.4422	6.6331	1.4390
7.0442	1.4353	7.2680	1.4331	9.7240	1.4051
10.346	1.3936				



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