各種光學鹽片物性 / 化性介紹

UV-Vis-IR Optical Materials

Material	Refractive Index n	Hardness (Knoop) psi	Modulus of Rupture* psi	Useful Transmission Range		Chemical Properties
				Windows (1-2mm) cm-1 micrometers	IREs (70mm) cm-1 micrometers	
BK-7 Glass	1.50	520	2400	31,000-4300 0.32-2.3	29,000-5000 0.34-1.97	Insoluble in water
UV Quartz UV SiO_2	1.44	461	7100	57,000-3000 0.175-3.4	50,000-4000 0.2-2.5	Insoluble in water；soluble in HF
UV Sapphire Al_2O_3	1.75	1370	65000	66,000-2000 0.15-5.0	33,000-2800 0.3-3.7	Very slightly soluble in acids and bases
Strontium Titinate $SrTiO_3$	2.41	595	7500	25,000-1700 0.395-6	25,000-2500 0.4-4	Readily attacked by HF；resistant to most solvents
Lithium Fluoride LiF	1.33	110	2000	90,000-1,500 0.11-7.0	50,000-2300 0.2-4.5	Slightly soluble in water；soluble in HF
Titanium Dioxide TiO_2	2.6；2.9	800	700	24,000-1700 0.42-6	20,000-2200 0.5-4.5	Soluble in H_2SO_4 and alkalis；insoluble in water and acids
Zirconium Dioxide ZrO_2	2.15	1250	7800	27,000-1,500 0.36-7	25,000-1800 0.4-5.5	Insoluble in water；soluble in HF and H_2SO_4
Magnesium Oxide MgO	1.68	640	19000	25,000-1300 0.15-8.0	20,000-1700 0.5-6.0	Soluble in acids and NH_4 salts
Silicon Si	3.42	1150	9000	10,000-100 1.0-100	9500-1500；350-FIR 1.06-6.7；30-FIR	Insoluble in most acids and bases；soluble in HF and HNO_3
Calcium Fluoride CaF2	1.4	158	5300	66,000-1300 0.15-8.0	33,000-1500 0.3-7.0	Insoluble in water；resists most acids and bases；soluble in NH_4 salts
Arsenic Trisulfide As_2S_3	2.4	109	2400	14,000-1200 0.7-9.0	12,500-1300 0.8-8.2	Soluble in alcohols and alkalis；slightly soluble in water
Strontium Fluoride SrF_2	1.44	1405	500	66,000-1000 0.15-11	33,000-1100 0.3-9.5	Very slightly soluble in water；soluble in hot HCl
Barium Fluoride BaF_2	1.45	82	3900	50,000-1000 0.2-11	33,000-1100 0.3-9.5	Low water solubility；soluble in acids and NH_4Cl
Zinc Sulfide ZnS	2.22	355	10000	22,000-750 0.45-14.0	14,000-1000 0.7-10	Soluble in acids；insoluble in water
Germanium Ge	4.0	550	7000	5000-600 2.0-17	5000-900 2.0-11.4	Insoluble in water；soluble in hot H_2SO_4 and aqua regia.
Arsenic Triselenide As_2Se_3	2.8	90	500	12,500-600 0.8-17	11,000-900 0.9-11.8	Insoluble in bases
Sodium Chloride NaCl	1.5	15	350+	28,000-700 0.35-15	25,000-900 0.4-12	Hygroscopic；slightly soluble in alcohols and NH_3
AMTIR (GeAsSe Glass)	2.5	170	2700	11,000-1000 0.99-11	11,000-1100 0.9-9.5	Insoluble in water
Gallium Arsenide GaAs	3.14	750	11000	10,000-600 1-17	10,000-700 1-14	Insoluble in water；slightly soluble in acids and bases
Zinc Selenide ZnSe	2.42	150	8000	20,000-500 0.5-20	20,000-700 0.5-14.3	Soluble in strong acids；dissolves in HNO_3
Potassium Chloride KCl	1.47	7	330+	33,000-500 0.3-20	20,000-700 0.5-15	Hygroscopic；water soluble；slightly soluble in alcohols
Silver Chloride AgCl	2.00	10	3800+	23,000-400 0.42-27	22,000-700 0.45-16	Insoluble in water；soluble in NH_4OH
Potassium Bromide KBr	1.52	7	160+	33,000-400 0.3-25	20,000-500 0.5-20	Soluble in water, alcohols and glycerine；hygroscopic
Silver Bromide AgBr	2.2	10	500+	20,000-300 0.5-35	20,000-500 0.5-22	Insoluble in water and alcohols；slightly soluble in NH_4OH
Cadmium Telluride CdTe	2.65	45	850	10,000-350 1.0-28	10,000-500 1.0-22	Insoluble in water and acid
Cestium Bromide CsBr	1.65	20	1220+	33,000-250 0.3-40	25,000-400 0.4-27	Soluble in water and acids；hygroscopic
Cesium O\Iodide CsI	1.72	20	810	33,000-150 0.3-70	20,000-400 0.5-30	Soluble in water and alcohol；hygroscopic
Thallium Bromoiodide KRS-5	2.35	40	3800+	16,000-200 0.6-60	14,000-400 0.7-30	Soluble in warm water；soluble in bases；insoluble in acids
Crystal Quartz SiO_2	1.5	741	1500	50,000-3600；250-30 0.2-2.8；40-333	250-FIR 40-FIR	Soluble in HF；insoluble in water
Polyethylene [PE] (high density)	1.55	5	400+	600-10 16-1000	600-FIR 16-FIR	Resistant to most solvents
Diamond C	2.4	7000	54400	45,000-2500；1600-FIR 0.22-4；6-FIR	45,000-2500；1600-FIR 6-FIR**	Insoluble in water, acids and bases

* The modulus of rupture, m, determines the size of the window needed to withstand a pressure, P. For a four times safety factor, the thickness of a mounted window, t, with an unsupported diameter, d, is: $t(\text{clamped})=0.866\, d(p/m)^{1/2}$

** Pathlength of a few mm

\+ The apparent elastic limit is reported for those materials which permanently bend prior to rupturing.