TeO_2

DESCRIPTION

Tellurium Dioxide (TeO_2, Paratellurite)is an excellent acousto-optic crystal material, it is widely applied in the production of Acousto-optic modulator (AOM), Acousto-optical deflector（AOD), Acousto-optical deflector（AOD), Laser Q-switches, RF spectrum analyzers in laser technology science and optoelectronic technology, because of its high figure of merit ,which depended on high elastic coefficient and high refractive index. TeO_2 acousto-optic deflectors are more suitable for acousto-optic effects with high diffraction efficiency, long bandwidth and high beam deflection speed. TeO_2 has been widely used to fabricate anomalous acousto-optic devices.

FEATURES

- Small sound attenuation
- Large sound and light quality factor
- High figure of merit
- Excellent sound and light characteristics
- High transparency to visible light
- High refractive index

APPLICATIONS

- 355nm laser(Medical Applications)
- 532nm laser
- 2100nm laser
- 2000nm laser
- Acousto-optic coordinating filter
- Acousto-optic deflector
- Acousto-optic modulator
- Acousto-optic tunable filter

PARAMETERS

PHYSICAL AND CHEMICAL PROPERTIES

Property	Value
Chemical formula	TeO_2
Molar mass	159.60 g/mol
Color	Colorless
Density	5.99 ± 0.03 /cm³
Melting Point	733°C
Hardness	3 – 4 Moh's hardness scale
Thermal expansion	10^{-6} K^{-1}: α_{11} = 17.7; α_{22} = 17.7; α_{33} = 5.5
Symmetry	Tetragonal, 422 (D4)
Lattice distances	a = 4.8122 Å; c = 7.6157 Å
Transmittivity	>70% at 633nm
Transmitting Range	0.33 ~ 5.0 microns

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REFRACTIVE INDEXES

λ, μm	n_o	n_e	$\Delta n = n_e - n_o$
0.4047	2.4315	2.6167	0.1852
0.4358	2.3834	2.5583	0.1749
0.4678	2.3478	2.5164	0.1686
0.4800	2.3366	2.5036	0.1670
0.5086	2.3150	2.4779	0.1629
0.5461	2.2931	2.4520	0.1589
0.5893	2.2738	2.4295	0.1557
0.6328	2.2597	2.4119	0.1522
0.6438	2.2562	2.4086	0.1524
0.690	2.2450	2.3955	0.1505
0.800	2.226	2.373	0.147
1.00	2.208	2.352	0.144

OPTICAL ACTIVITY, ALONG [001]

λ, μm	p, deg/mm	λ, μm	p, deg/mm
0.3698	587.1	0.5893	104.9
0.3783	520.6	0.6328	86.9
0.3917	437.4	0.700	67.4
0.4152	337.6	0.800	48.5
0.4382	271.0	0.900	37.4
0.4630	221.1	1.00	29.5
0.4995	171.2	1.10	23.8
0.5300	143.4		

TeO_2 MODULATOR PROPERTIES

AOM main characteristics	Typical values for TeO_2 modulators
Optical Wavelength Range	514nm, 633nm, 1064nm, 1330nm
Optical Aperture	0.3 mm – 3 mm
Operating Mode	Longitudinal, axis (001)
Optical Rise Time	9-200 nsec on beam diametr
Beam Separation (633 nm)	10-30 mrad
Diffraction Efficiency	70-85 %
Modulation Frequency (-3db)	6-50 MHz

TeO2 DEFLECTOR PROPERTIES

AOD main characteristics	Typical values for TeO_2 deflectors
Optical Wavelength Range	540nm-530nm, 630nm-850nm, 700nm-1100nm, 1064nm, 1330nm
Optical Aperture	1 mm – 10 mm
Operating Mode	Shear Wave, 3-15 degrees of axis (110)
Center frequency	20- 200 MHz
Diffraction efficiency	60-95%
Time aperture	1-15 μs
Resolution (T.BW product)	200-2000
Optical Rise Time	9-200 nsec on beam diameter
Deflection Angle	10-100 mrad
ΔDeflection Angle	5-50 mrad
RF input power	0,1- 2 Wt

TeO_2 TUNABLE FILTER PROPERTIES

AOTF main characteristics	Typical values for TeO2 AOTFs
Tuning Range	450-750nm, 900-1200nm, 1200-2500nm, 2500-5000nm
Bandwidth	0.5 nm – 15 nm
Operating Mode	Slowshear, noncollinear propagation
Angular aperture	2-10 degrees
Optical Aperture	3×3 mm – 30×30 mm
Diffraction Efficiency	70-85 %
RF power	1-10 Wt

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ACOUSTOOPTICAL PROPERTIES: Λ = 0.6328 MM

N_{sound}	U_{sound}	V_{sound} 10^3 м/с	Nlight	Elight	M1 $10^{-7}cm^2 \cdot$ с/г	M2 10^{-18} c^3/г
[100]	[100]	2.98	[010]	[100]	0.097	0.048
[100]	[100]	-	[010]	[001]	22.9	10.6
[001]	[001]	4.26	[010]	[100]	142	34.5
[001]	[001]	-	[010]	[001]	113	25.6
[100]	[010]	3.04	[001]	optional	3.70	1.76
[110]	[110]	4.21	[-110]	[110]	323	0.802
[110]	[110]	-	[-110]	[001]	16.2	3.77
[101]	[101]	3.64	[-101]	[010]	101	33.4
[010]	[010]	2.98	[-101]	[101]	42.6	20.4
[110]	[-110]	0.617	[001]	optional	68.6	793
[101]	[-101]	2.08	[010]	[100]	76.4	77