

Yb:KGW AND Yb:KYW CRYSTALS LASER LINES AND HARMONICS



Yb:KGW and Yb:KYW crystals have broad emission bandwidths and are used as lasing materials to generate ultrashort (~100 – 200 fs) high power pulses. Direct pump of Yb:KGW/KYW crystals with laser diodes operating at 981 nm supports compact laser systems. Yb:KGW/KYW laser generates

pulses at 1023 – 1060 nm wavelength range. Also Yb:KGW and Yb:KYW can be used as ultrashort pulse amplifiers. We believe that Yb:KGW and Yb:KYW are some of the best materials for high power thin disk lasers generating femtosecond pulses.

Properties of Yb:KGW and Yb:KYW

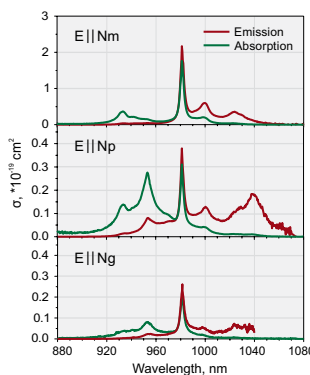
Name	Yb:KGW	Yb:KYW
Yb ³⁺ concentration	0.5–5%	0.5–100%
Crystal structure	monoclinic	monoclinic
Point group	C2/c	C2/c
Lattice parameters	a=8.095 Å, b=10.43 Å, c=7.588 Å, β=94.43°	a=8.05 Å, b=10.35 Å, c=7.54 Å, β=94°
Thermal expansion	α _a =4×10 ⁻⁶ /°C, α _b =3.6×10 ⁻⁶ /°C, α _c =8.5×10 ⁻⁶ /°C	—
Thermal conductivity	K _a =2.6 W/mK, K _b =3.8 W/mK, K _c =3.4 W/mK	—
Density	7.27 g/cm ³	6.61 g/cm ³
Mohs' hardness	4–5	4–5
Melting temperature	1075 °C	—
Transmission range	0.35–5.5 μm	0.35–5.5 μm
Refractive indices (λ=1.06 μm)	n _g =2.037, n _p =1.986, n _m =2.033	—
Thermo-optic coefficients @ 1064 nm	∂n _p /∂T= -15.7×10 ⁻⁶ K ⁻¹ ∂n _m /∂T= -11.8×10 ⁻⁶ K ⁻¹ ∂n _g /∂T= -17.3×10 ⁻⁶ K ⁻¹	<i>For 20% Yb:KYW</i> ∂n _p /∂T= -13.08×10 ⁻⁶ K ⁻¹ ∂n _m /∂T= -7.61×10 ⁻⁶ K ⁻¹ ∂n _g /∂T= -11.83×10 ⁻⁶ K ⁻¹
Laser wavelength	1023–1060 nm	1025–1058 nm
Fluorescence lifetime	0.3 ms	0.3 ms
Stimulated emission cross section (E a)	2.6×10 ⁻²⁰ cm ²	3×10 ⁻²⁰ cm ²
Absorption peak and bandwidth	α _a =26 cm ⁻¹ , λ=981 nm, Δλ=3.7 nm	α _a =40 cm ⁻¹ , λ=981 nm, Δλ=3.5 nm
Absorption cross section	1.2×10 ⁻¹⁹ cm ²	1.33×10 ⁻¹⁹ cm ²
Lasing threshold	35 mW	70 mW
Stark levels energy (in cm ⁻¹) of the ² F _{5/2} manifolds of Yb ³⁺ @ 77K	10682, 10471, 10188	10695, 10476, 10187
Stark levels energy (in cm ⁻¹) of the ² F _{7/2} manifolds of Yb ³⁺ @ 77K	535, 385, 163, 0	568, 407, 169, 0

Features

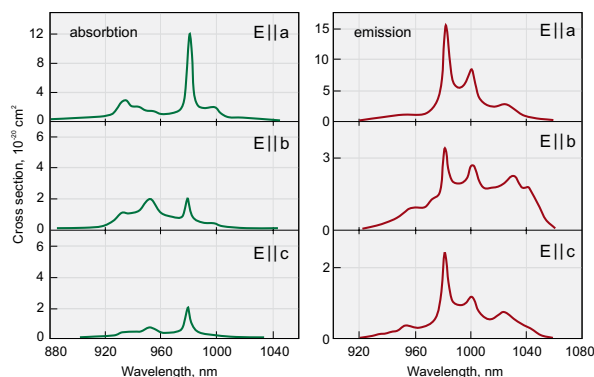
- High absorption coefficient at 981 nm
- High stimulated emission cross section
- Low laser threshold
- Extremely low quantum defect λ_{pump} / λ_{se}
- Broad polarized output at 1023–1060 nm
- High slope efficiency with diode pumping (~ 60%)
- High Yb doping concentration

Custom manufacturing capabilities

- Various shapes (slabs, rods, cubes, disks)
- Different dopant levels
- Diversified coatings
- Attractive prices for introductory quantities to OEMs



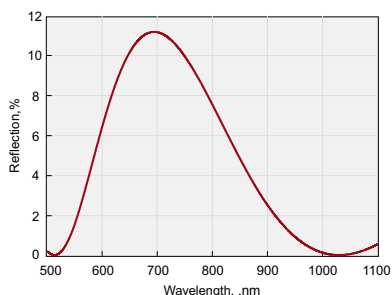
Absorption and stimulated emission cross sections of Yb:KYW



Absorption and emission spectrae of Yb(5%):KGW

BBO AND LBO CRYSTALS FOR Yb:KGW/KYW FREQUENCY CONVERSION

EKSMA OPTICS recommends the following thickness BBO and LBO crystals for Yb:KGW/KYW frequency conversion depending on fundamental wavelength pulse duration, assuming it is spectrum limited Gaussian pulse.



Typical AR@1030+515 nm coating for LBO or BBO SHG@1030 nm application

LBO FOR SHG @ 1030 nm

SHG LBO crystals. Type 1, Thickness = 0.9 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	90	13.8	AR/AR @ 515+1030 nm	LBO-601H
10×10	90	13.8	AR/AR @ 515+1030 nm	LBO-1001H

SHG LBO crystals. Type 1, Thickness = 2.8 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	90	13.8	AR/AR @ 515+1030 nm	LBO-603H
10×10	90	13.8	AR/AR @ 515+1030 nm	LBO-1003H

BBO FOR SHG @ 1030 nm

SHG BBO crystals. Type 1, Thickness = 0.5 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	23.4	90	AR/AR @ 515+1030 nm	BBO-651H
10×10	23.4	90	AR/AR @ 515+1030 nm	BBO-1051H

SHG BBO crystals. Type 1, Thickness = 1.5 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	23.4	90	AR/AR @ 515+1030 nm	BBO-653H
10×10	23.4	90	AR/AR @ 515+1030 nm	BBO-1053H

BBO FOR THG @ 1030 nm

Aperture, mm	Thickness, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	0.15	32.5	90	AR/AR @ 1030+515/343 nm	BBO-631H
6×6	0.25	32.5	90	AR/AR @ 1030+515/343 nm	BBO-632H
6×6	0.4	32.5	90	AR/AR @ 1030+515/343 nm	BBO-633H
6×6	0.55	32.5	90	AR/AR @ 1030+515/343 nm	BBO-634H

BBO crystals

Pulse duration	BBO SHG @ 1030 nm	BBO THG @ 1030 nm	BBO 4HG @ 1030 nm
50 fs	0.5 mm	0.15 mm	0.1 mm
100 fs	1 mm	0.25 mm	0.15 mm
150 fs	1.5 mm	0.4 mm	0.2 mm
200 fs	2 mm	0.55 mm	0.3 mm

LBO crystals

Pulse duration	LBO SHG @ 1030 nm
50 fs	0.9 mm
100 fs	1.9 mm
150 fs	2.8 mm
200 fs	3.7 mm

Note:

LBO crystals can be supplied with Clear Aperture up to Ø50 mm.

SHG LBO crystals. Type 1, Thickness = 1.9 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	90	13.8	AR/AR @ 515+1030 nm	LBO-602H
10×10	90	13.8	AR/AR @ 515+1030 nm	LBO-1002H

SHG LBO crystals. Type 1, Thickness = 3.7 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	90	13.8	AR/AR @ 515+1030 nm	LBO-604H
10×10	90	13.8	AR/AR @ 515+1030 nm	LBO-1004H

SHG BBO crystals. Type 1, Thickness = 1.0 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	23.4	90	AR/AR @ 515+1030 nm	BBO-652H
10×10	23.4	90	AR/AR @ 515+1030 nm	BBO-1052H

SHG BBO crystals. Type 1, Thickness = 2.0 mm

Aperture, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	23.4	90	AR/AR @ 515+1030 nm	BBO-654H
10×10	23.4	90	AR/AR @ 515+1030 nm	BBO-1054H

BBO FOR 4HG @ 1030 nm

Aperture, mm	Thickness, mm	θ , deg	ϕ , deg	Coating	Catalogue number
6×6	0.1	50	90	P/P @ 515/257 nm	BBO-641H
6×6	0.15	50	90	P/P @ 515/257 nm	BBO-642H
6×6	0.2	50	90	P/P @ 515/257 nm	BBO-643H
6×6	0.3	50	90	P/P @ 515/257 nm	BBO-644H

**PHOTO
TECHNICA** フォトテクニカ株式会社

〒336-0017 埼玉県さいたま市南区南浦和 2-18-2

TEL:048-871-0067 FAX:048-871-0068

e-mail:voc@phototechnica.co.jp