Yb:KGW / Yb:KYW – Yb-DOPED POTASSIUM GADOLINIUM TUNGSTATE

FEATURES

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

APPLICATIONS

- Yb:KGW and Yb:KYW thin (100–150 µm) crystals are used as lasing materials to generate ultrashort (hundreds of fsec) high power (>22 W) pulses. Standard pumping @ 981 nm, output: 1023–1060 nm
- Yb:KGW and Yb:KYW can be used as ultrashort pulses amplifiers
- Yb:KGW and Yb:KYW are some of the best materials for high power thin disk lasers

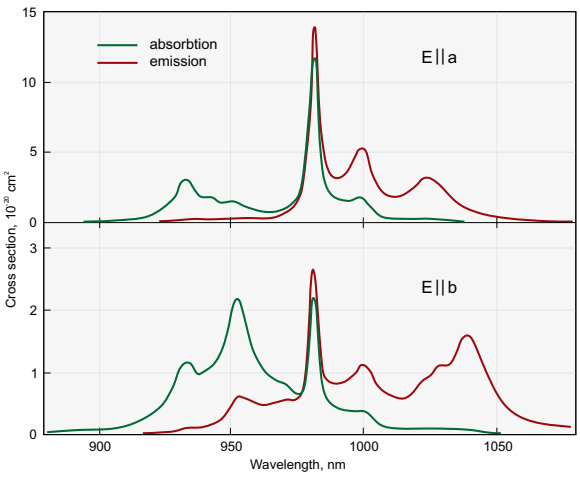
Yb-Doped Potassium Gadolinium Tungstate (**Yb:KGd(WO$_4$)$_2$**) and Yb-doped Potassium Itrium Tungstate (**Yb:KY(WO$_4$)$_2$**) single crystals are the laser crystals for diode or laser pumped solid-state laser applications.

Custom manufacturing capabilities

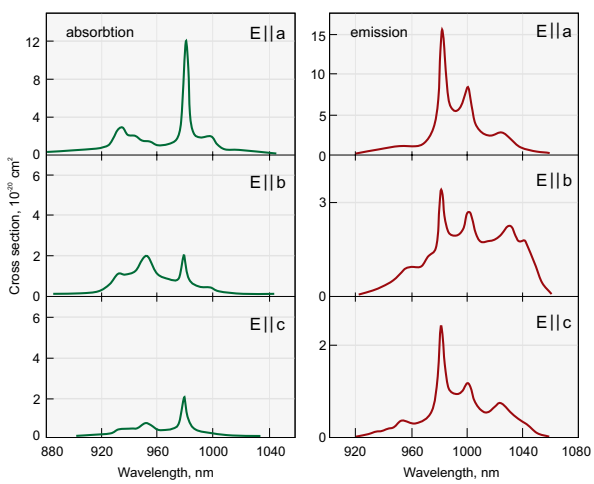
- Various shapes (slabs, rods, cubes)
- Different dopant levels
- Diversified coatings

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	$\alpha_a=4\times10^{-6}$ /°C, $\alpha_b=3.6\times10^{-6}$ /°C, $\alpha_c=8.5\times10$	—
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	$\partial n_p/\partial T=-15.7\times10^{-6}$ K^{-1} $\partial n_m/\partial T=-11.8\times10^{-6}$ K^{-1} $\partial n_g/\partial T=-17.3\times10^{-6}$ K^{-1}	*For 20% Yb:KYW* $\partial n_p/\partial T=-13.08\times10^{-6}$ K^{-1} $\partial n_m/\partial T=-7.61\times10^{-6}$ K^{-1} $\partial n_g/\partial T=-11.83\times10^{-6}$ 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 $^2F_{5/2}$ manifolds of Yb^{3+} @ 77K	10682, 10471, 10188	10695, 10476, 10187
Stark levels energy (in cm^{-1}) of the $^2F_{7/2}$ manifolds of Yb^{3+} @ 77K	535, 385, 163, 0	568, 407, 169, 0



Absorption and emission spectra of Yb(5%):KYW



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