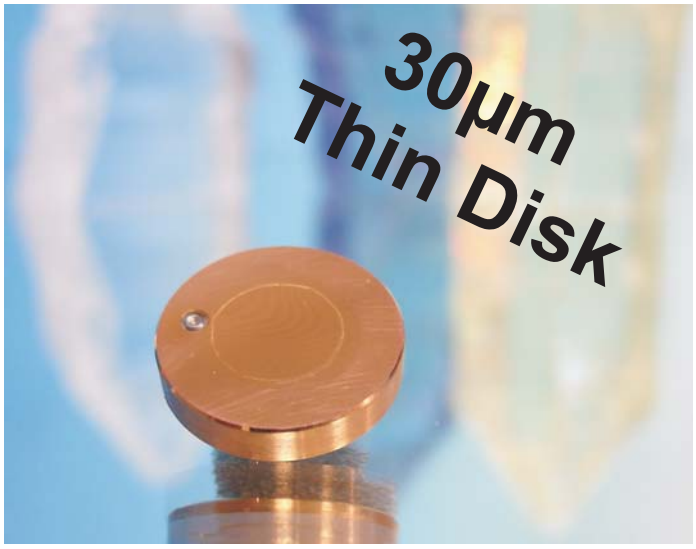
# Yb:MDT

## monoclinic double tungstate




**$Yb^{3+}$ doped KGW and KYW single crystals are known as the best laser active material for diode or laser pumped solid-state laser. VCT AG is now presenting $Yb^{3+}$ doped KLW, with the possibilty of Yb doping higher than 16at.%. Basic optical and laser properties are expected to be like $Yb^{3+}$ doped KGW and KYW.**

### Properties

- material with highest absorption cross section for 940nm and 980nm
- high stimulated emission cross section
- low quantum defect (1% @981nm pump/991nm lasing[1]; 4% @981nm pump/1025nm lasing)
- output at 1030nm($N_m$), 1040nm($N_p$)
- tunable output from 991[1]-1070nm
- $Yb^{3+}$ concentration from 0.5-100at.% (KYbW)
- high slope efficiency (up to 87%)[2] @ $TEM_{00}$ pump and for diode laser pumping (60%)[3]

### Applications

- Yb:MDT crystals are used to generate ultrashort (<100fs) high power (>22W) pulses[4]
- ultrashort pulses (71fs Kerr-lens mode locking[5], 112fs SESAM mode locking[6])
- Yb:MDT for ultrashort pulse amplifier
- Yb:MDT the best material for high power thin disk lasers

### Customs orders

- doping levels from 0.5at.% to 100at.%
- AR/HR coatings
- slabs, rods, cubes and thin disks (down to 30µm thickness)
- from prototype to OEM quantities

VCT AG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[4] F.Brunner, et. al; Optics Letters; Vol.27; No.13; July 1; 2002; page 1162
[5] H.Liu, J.Nees and G.Mourou, Optics Letters; Vol.26; 2001; page 1723
[6] F.Brunner, G.J.Spühler, et. Al; Optics Letters; Vol. 25; 2000; page 1119
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[8] M.C.Pujol, M.A.Bursukova, et. Al; Physical Review B; Vol.65; 2002; page 165121
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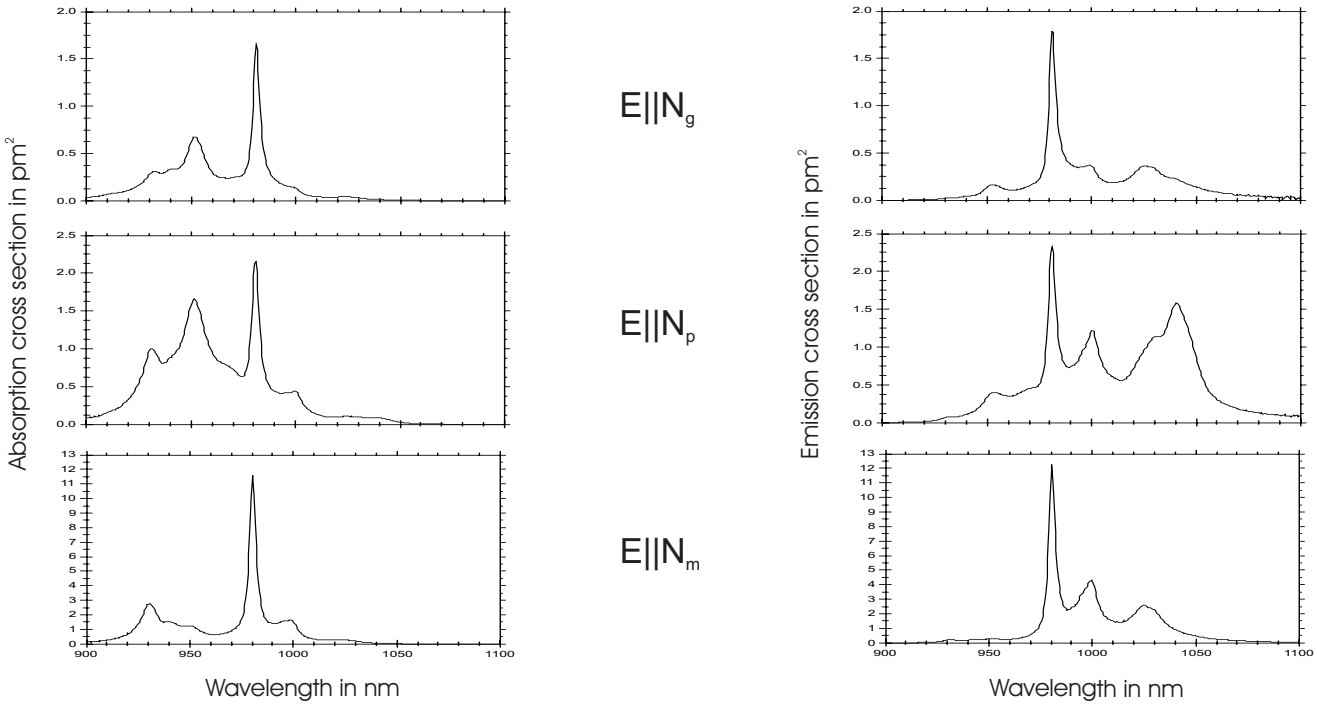
| **Physical properties:** | **Yb:KGW** | **Yb:KYW** | **KYbW** |
|---|---|---|---|
| $Yb^{3+}$ concentration | 0.5-10% | 0.5-16% | 100% |
| crystal structure | monoclinic | monoclinic | monoclinic |
| thermal conductivity | $K_a$=2.6W/mK, | $K_a$=2.6W/mK | - |
| | $K_b$=3.8W/mK, | $K_b$=3.8W/mK | - |
| | $K_c$=3.4W/mK, | $K_c$=3.4W/mK | - |
| Moh`s hardness | 4-5 | 4-5 | - |
| melting temperature | 1075°C | 1075°C | 1045°C[7] |
| **Optical properties:** | | | |
| transmission range | 0.35-5.5µm | 0.35-5.5µm | 0.35-5.5µm |
| index of refraction (@1.06µm) | $N_p$=1.986 | $N_p$=1.986 | $N_p$=1.992 |
| | $N_m$=2.033 | $N_m$=2.033 | $N_m$=2.036 |
| | $N_g$=2.037 | $N_g$=2.037 | $N_g$=2.077 |
| **Laser properties:** | | | |
| wavelength tuning range | 0.991-1.07µm | 0.991-1.07µm | 0.991-1.07µm |
| smallest quantum defect | - | - | 1%[1] / 1.6%[7] |
| nonlinear refractive index $n^2$ | $8.7x10^{-16}cm^2/W$[9] | $8.7x10^{-16}cm^2/W$[9] | $8.7x10^{-16}cm^2/W$[9] |
| Fluorescence lifetime | 280µs | 280µs | 200µs[8] |
| stimulated emission cross section | $2.8x10^{-20}cm^2$ | $3.0x10^{-20}cm^2$ | $2.6x10^{-20}cm^2$ |
| absorption peak | 981nm | 981nm | 981nm |
| absorption cross section | $1.2x10^{-19}cm^2$[2] | $1.33x10^{-19}cm^2$[2] | $1.17x10^{-19}cm^2$[8] |
| absorption bandwidth | 3.5nm[2] | 3.5nm[2] | 4nm[8] |




Emission and absorption spectra of KYbW (100at.% Yb:KYW, stoichiometric KYbW)

For more Information and higher resolution curves, see www.vct-ag.com