

## Nd:KGW

### Introduction

Neodymium doped Potassium-Gadolinium Tungstate crystals (Nd:KGd(WO<sub>4</sub>)<sub>2</sub> or Nd:KGW) is an excellent laser gain material which has low laser oscillations threshold and higher emission section. The fluorescent concentration quench effect of the Nd<sup>3+</sup> ion in the KGW crystal may be weakened due to the W-O covalent bond, so this crystal has a higher doping concentration of active ion. Furthermore, the absorption band at 808nm of Nd<sup>3+</sup> in the KGW which has 12nm FWHM is well matched with the emission wavelength of current commercial laser diode.

### Basic Properties

Crystal structure	monoclinic
Space group	C <sub>2h</sub> (2/c)-C2/c
Cell Parameters	a = 8.087 Å; b = 10.374 Å; c = 7.588 Å β=94.41°
Refractive index, at 1067 nm	n <sub>q</sub> = 2.049; n <sub>p</sub> = 1.978; n <sub>m</sub> = 2.014
Mohs hardness	5
Density, g/cm <sup>3</sup>	7.27
Melting Point	1075 °C
Thermal conductivity at 373K, W x cm <sup>-1</sup> x K <sup>-1</sup>	K <sub>[100]</sub> = 0.026; K <sub>[010]</sub> = 0.038; K <sub>[001]</sub> = 0.034
Young's modulus, GPa	E <sub>[100]</sub> = 115.8; E <sub>[010]</sub> = 152.5; E <sub>[001]</sub> = 92.4
Thermal expansion coefficient, at 373K	α <sub>[100]</sub> = 4 x 10 <sup>-6</sup> K <sup>-1</sup> ; α <sub>[010]</sub> = 1.6 x 10 <sup>-6</sup> K <sup>-1</sup> ; α <sub>[001]</sub> = 8.5 x 10 <sup>-6</sup> K <sup>-1</sup>
Lasing Wavelength	911nm, 1067nm, 1351nm
Absorption band	808nm (FWHM 12nm)
Fluorescent lifetime	110 μs (3% doping), 90 μs (8% doping)

### Laser Properties

3%Nd:KGW	Emission wavelength	1070nm
	Emission bandwidth	15nm
	Stimulated emission cross-section σ <sub>e</sub> (x10 <sup>-20</sup> cm <sup>2</sup> )	1.48
	Fluorescent lifetime (μs)	109
	Gain bandwidth	15nm
	Absorption wavelength	810nm
	Absorption bandwidth	14nm
	Absorption cross-section σ <sub>a</sub> (x10 <sup>-20</sup> cm <sup>2</sup> )	1.28

## Specifications of Nd:KGW

Orientation	[010]
Standard Dopant concentration (at. %)	3%, 5%, 8%
Maximum length	50mm
Length tolerance, mm	+1.0 / -0.0
Diameter tolerance, mm	+/-0.1
Parallelism	< 30''
Perpendicularity	< 15'
Surface quality	20/10
coating	AR-coated

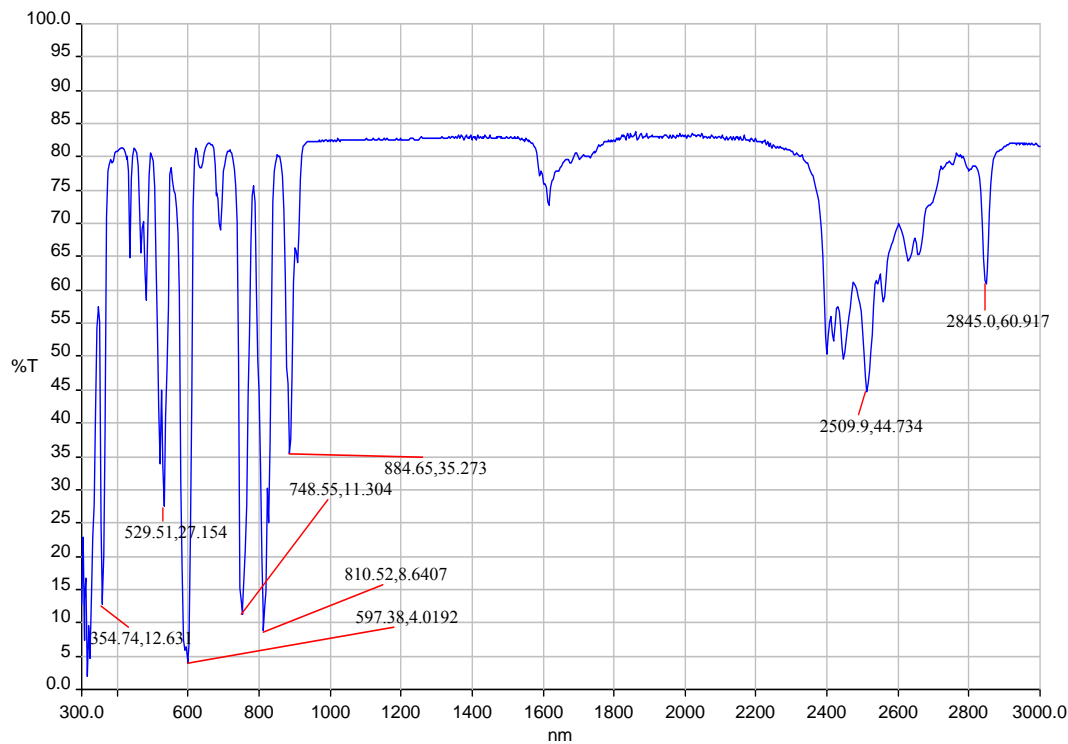


Figure 1. Transparency curve of Nd:KGW

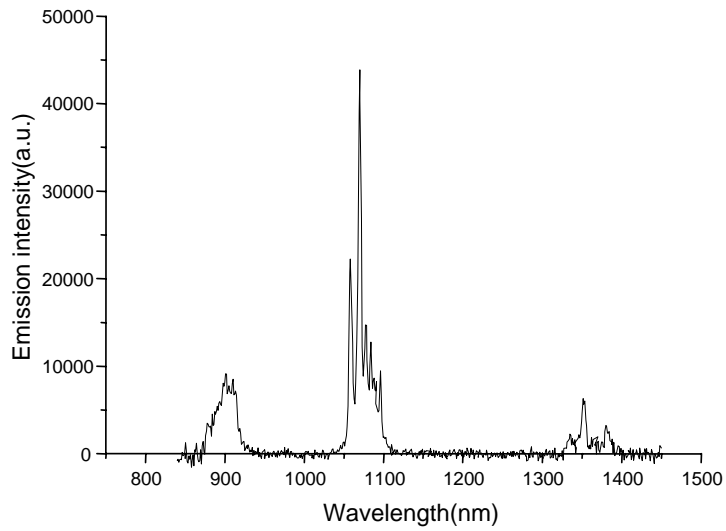


Figure 2. Emission spectra of 3%Nd:KGW

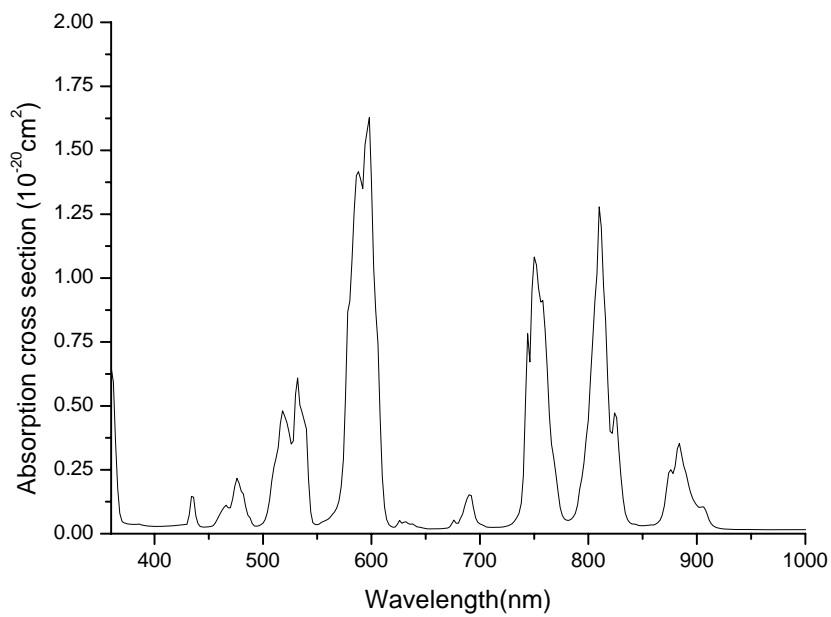


Figure 3. Absorption spectra of 3%Nd:KGW