

Nd:KGW

Introduction

Neodymium doped Potassium-Gadolinium Tungstate crystals (Nd:KGd(WO₄)₂ 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 Nd³⁺ 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 Nd³⁺ 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 _{2h} (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 _g = 2.049; n _p = 1.978; n _m = 2.014
Mohs Hardness	5
Density, g/cm ³	7.27
Melting Point	1075°C
Thermal Conductivity at 373K, W x cm ⁻¹ x K ⁻¹	K _[100] = 0.026; K _[010] = 0.038; K _[001] = 0.034
Young's Modulus, GPa	E _[100] = 115.8; E _[010] = 152.5; E _[001] = 92.4
Thermal Expansion Coefficient, at 373K	α _[100] = 4 x 10 ⁻⁶ K ⁻¹ ; α _[010] = 1.6 x 10 ⁻⁶ K ⁻¹ ; α _[001] = 8.5 x 10 ⁻⁶ K ⁻¹
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 _e (x10 ⁻²⁰ cm ²)	1.48
	Fluorescent Lifetime(μs)	109
	Gain Bandwidth	15nm
	Absorption Wavelength	810nm
	Absorption Bandwidth	14nm
	Absorption Cross-section σ _a (x10 ⁻²⁰ cm ²)	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

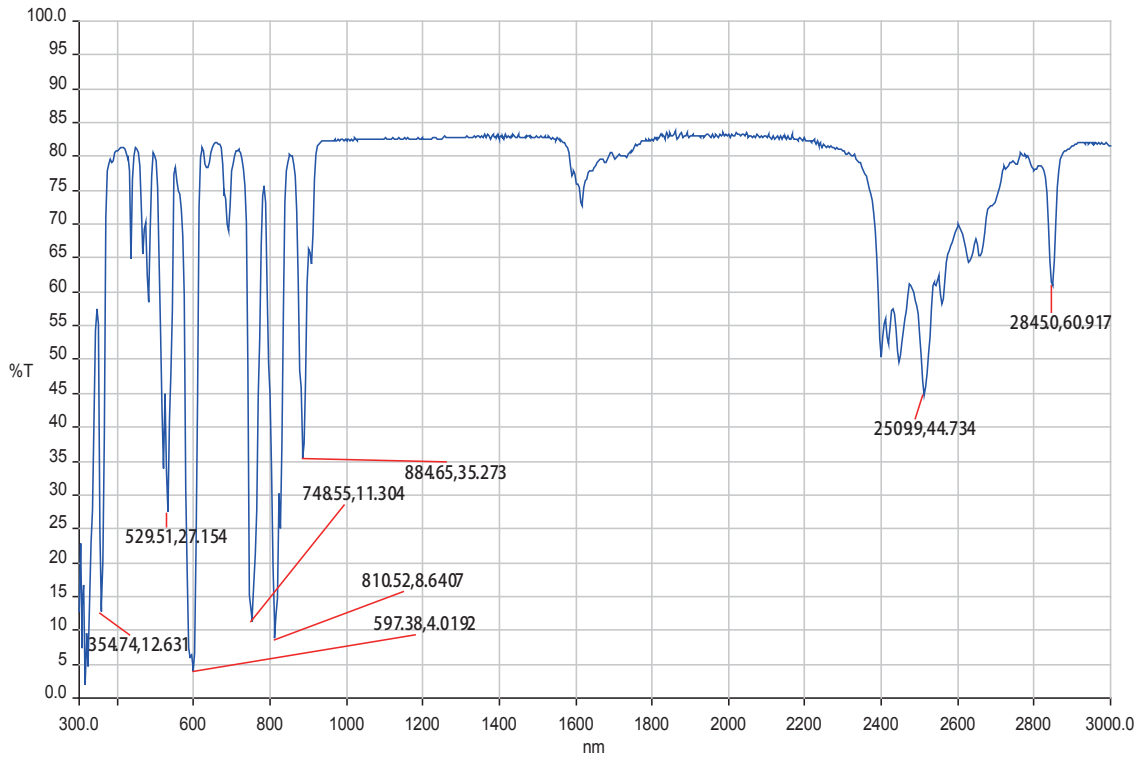


Figure 1. Transparency curve of Nd:KGW

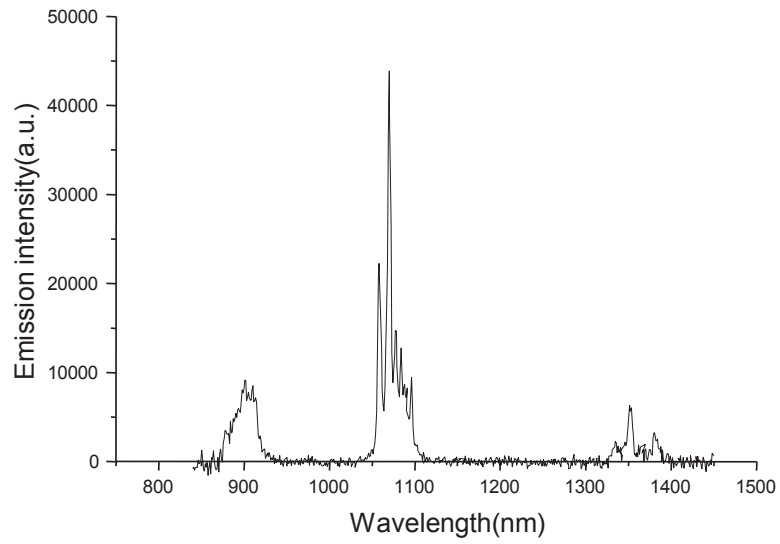


Figure 2. Emission spectra of 3%Nd:KGW

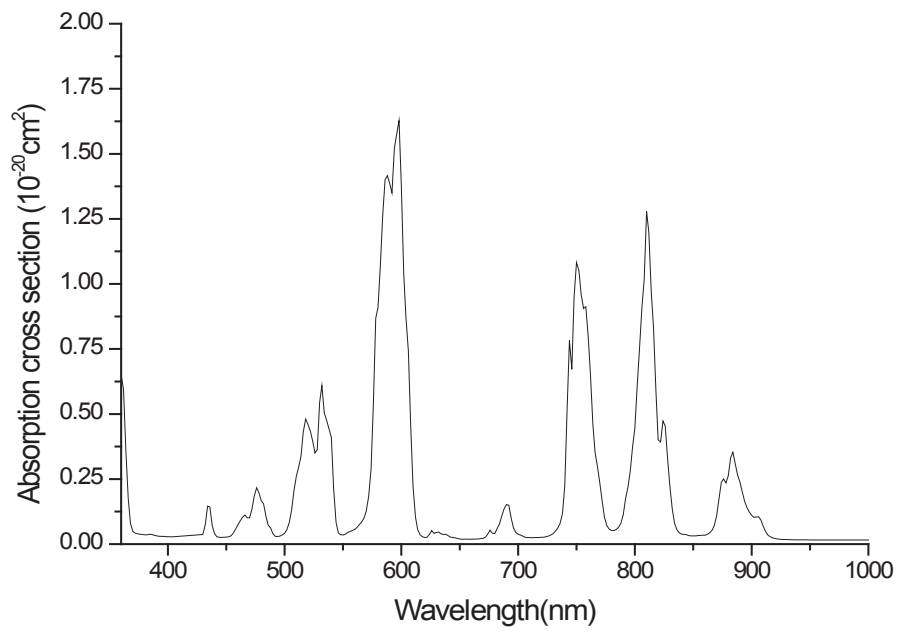


Figure 3. Absorption spectra of 3%Nd:KGW