

## Nd:YVO<sub>4</sub>晶体

掺钕钒酸钇 (Nd:YVO<sub>4</sub>) 晶体是一种性能优良的激光晶体, 适于制造激光二极管泵浦特别是中低功率的激光器。与 Nd:YAG 相比 Nd:YVO<sub>4</sub> 对泵浦光有较高的吸收系数和更大的受激发射截面。激光二极管泵浦的 Nd:YVO<sub>4</sub> 晶体与 LBO, BBO, KTP 等高非线性系数的晶体配合使用, 能够达到较好的倍频转换效率, 可以制成输出近红外、绿色、蓝色到紫外线等类型的全固态激光器。



### Nd:YVO<sub>4</sub> 晶体的基本属性

原子密度	1.26x10 <sup>20</sup> atoms/cm <sup>3</sup> (Nd 1.0%)
晶体结构	四方, 空间群 D <sub>4h</sub> -I4/amd a=b=7.1193Å, c=6.2892Å
密度	4.22g/cm <sup>3</sup>
莫氏硬度	4-5( 近似玻璃 )
热膨胀系数 (300K)	α <sub>s</sub> =4.43x10 <sup>-6</sup> /K α <sub>c</sub> =11.37x10 <sup>-6</sup> /K
热传导系数 (300K)	// C : 0.0523W/cm/K ⊥ C : 0.0510W/cm/K

### Nd:YVO<sub>4</sub> 晶体的特性

发射波长	1064nm, 1342nm
热光系数 (300K)	dn <sub>o</sub> /dT=8.5×10 <sup>-6</sup> /K dn <sub>e</sub> /dT=2.9×10 <sup>-6</sup> /K
受激辐射截面	25×10 <sup>-19</sup> cm <sup>2</sup> @ 1064nm
荧光寿命	90μs(1%)
吸收系数	31.4cm <sup>-1</sup> @810nm
内在损失	0.02cm <sup>-1</sup> @1064nm
增益带宽	0.96nm@1064nm
极化激光辐射	π 偏振; 平行于光轴 (C 轴)
二极管泵浦光 - 光效率	>60%
Sellmeier 方程 (λ in μm)	n <sub>o</sub> <sup>2</sup> =3.77834+0.069736/(λ <sup>2</sup> -0.04724)-0.010813λ <sup>2</sup> n <sub>e</sub> <sup>2</sup> =4.59905+0.110534/(λ <sup>2</sup> -0.04813)-0.012676λ <sup>2</sup>

## Yttrium Vanadate (Nd:YVO<sub>4</sub>) Crystals

Yttrium Vanadate (Nd:YVO<sub>4</sub>) crystals are positive uniaxial crystals grown using the Czochralski method. They have good mechanical and physical properties and are ideal for optical polarizing components because of their wide transparency range and large birefringence. They are an excellent synthetic substitute for Calcite (CaCO<sub>3</sub>) and rutile (TiO<sub>2</sub>) in many applications including fiber optic isolators and circulators, beam displacers, Glan polarizers and other polarizing optics.

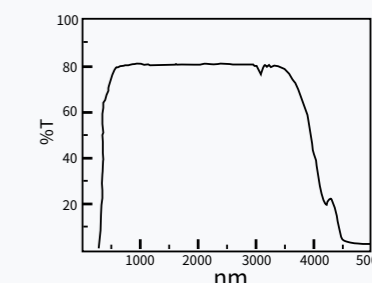


### Basic Properties of Nd:YVO<sub>4</sub>

Atomic Density	1.26x10 <sup>20</sup> atoms/cm <sup>3</sup> (Nd1.0%)
Crystal Structure Cell Parameter	Zircon Tetragonal, space group D <sub>4h</sub> -I4/amd a=b=7.1193Å, c=6.2892Å
Density	4.22g/cm <sup>3</sup>
Mohs Hardness	4-5 (Glass-like)
Thermal Expansion Coefficient (300K)	α <sub>s</sub> =4.43x10 <sup>-6</sup> /K α <sub>c</sub> =11.37x10 <sup>-6</sup> /K
Thermal Conductivity Coefficient (300K)	// C : 0.0523W/cm/K ⊥ C : 0.0510W/cm/K
Lasing wavelength	1064nm, 1342nm
Thermal optical coefficient (300K)	dn <sub>o</sub> /dT=8.5×10 <sup>-6</sup> /K dn <sub>e</sub> /dT=2.9×10 <sup>-6</sup> /K
Stimulated emission cross-section	25×10 <sup>-19</sup> cm <sup>2</sup> @ 1064nm
Fluorescent lifetime	90μs(1%)
Absorption coefficient	31.4cm <sup>-1</sup> @810nm
Intrinsic loss	0.02cm <sup>-1</sup> @1064nm
Gain bandwidth	0.96nm@1064nm
Polarized laser emission	polarization; parallel to optical axis (c-axis)
Diode pumped optical to optical efficiency	>60%
Sellmeier equations (λ in μm)	n <sub>o</sub> <sup>2</sup> =3.77834+0.069736/(λ <sup>2</sup> -0.04724)-0.010813λ <sup>2</sup> n <sub>e</sub> <sup>2</sup> =4.59905+0.110534/(λ <sup>2</sup> -0.04813)-0.012676λ <sup>2</sup>

### Capabilities

Attribute	Commercial	High Precision
Optical Axis Orientation	±0.5°	±0.1°
Parallelism	20"	10"
Perpendicularity	15'	5'
Flatness	λ/4	λ/10
Surface Quality	40-20 scratch and dig	10-5 scratch and dig
Dimension Tolerance	±0.1mm	±0.005mm
Ar Coating	R<0.2%@1550±40nm	Specified



Transparency Curve for Nd:YVO<sub>4</sub> (Thickness=1mm)