

IOG-2 Phosphate Laser Glass

For High Gain Applications

IOG-2 is a potassium-barium-alumino phosphate glass with high erbium and ytterbium cross sections for stimulated emission. Although not as chemically durable as IOG-1, IOG-2 is an excellent candidate for active photonic devices that require high gain.

Optical Properties

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|---------------------------|-------|
| n_d | 1.518 |
| v_d | 66.8 |
| n_{1000nm} (calculated) | 1.510 |
| n_{1540m} (calculated) | 1.508 |

Erbium Laser Properties

| | |
|--|------|
| Emission Maxima, λ (nm) | 1533 |
| Emission Cross Section at 1533 nm (10^{-21} cm^2) | 8.0 |
| Excited State Lifetime for the 1533 nm Band (ms) | 9.0 |
| Max Absorption Cross Section for 980nm Pump Band (10^{-21} cm^2) | 2.4 |

Ytterbium Laser Properties

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|--|------|
| Emission Maxima, λ (nm) | 1000 |
| Emission Cross Section at 1000 nm (10^{-21} cm^2) | 5.4 |
| Excited State Lifetime for the 1000 nm Band (ms) | 1.5 |
| Max Absorption Cross Section for 980nm Pump Band (10^{-21} cm^2) | 14.1 |

Chemical Properties

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|---|-------|
| Weight Loss in 50°C Water (mg/($\text{cm}^2 \cdot \text{day}$)) | 0.028 |
| Acid Resistance SR pH=0.3 at 25°C | 4.0 |
| Alkali Resistance AR pH=12 at 50°C | 4.0 |
| Staining Resistance FR pH=4.6 100h at 25°C | 1 |
| Climactic Resistance CR Water Vapor at 40-50°C for 30 h | 2 |

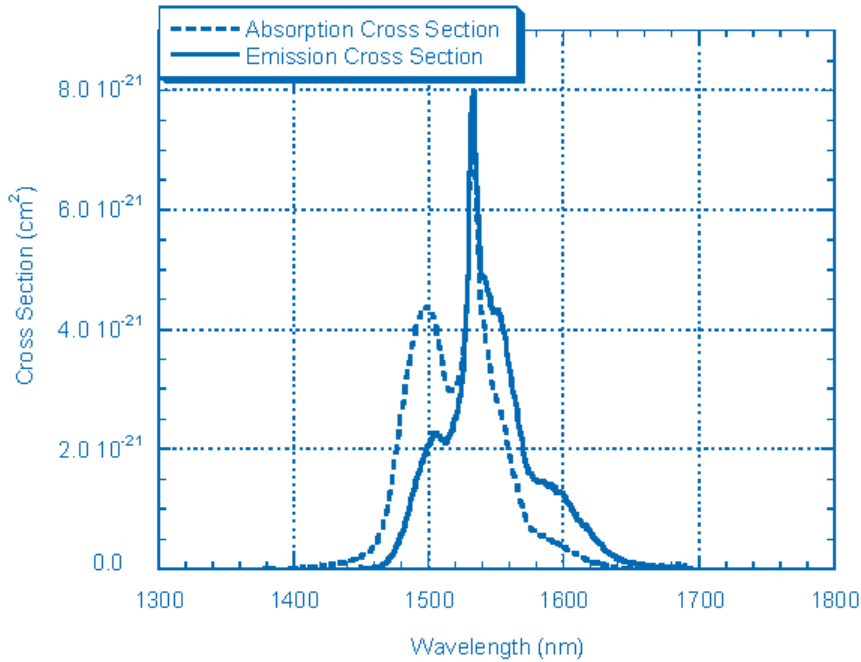
Physical Properties

| | |
|---|------|
| Density, ρ (g/cm^3) | 2.72 |
| Thermal Conductivity (25°C), K ($\text{W}/\text{m}\cdot\text{K}$) | 0.57 |
| Young's Modulus, E (GPa) | 54 |
| Poisson's Ratio, ν | 0.27 |
| Fracture Toughness, K_{Ic} ($\text{MPa}\cdot\text{m}^{1/2}$) | 0.47 |
| Knoop Hardness, $HK_{0.1/20}$ | 340 |
| Heat Capacity (25°C), C_p ($\text{J}/\text{g}\cdot\text{K}$) | 0.75 |
| Thermal Diffusivity (25°C), σ ($10^{-7} \text{ m}^2/\text{sec}$) | 2.92 |
| Thermal Expansion, $\alpha_{20-300^\circ\text{C}}$ ($10^{-7}/\text{K}$) | 145 |
| Thermal Expansion, $\alpha_{20-40^\circ\text{C}}$ ($10^{-7}/\text{K}$) | 125 |
| Glass Transformation Temperature, T_g (°C) | 375 |

- Properties will vary slightly with doping content

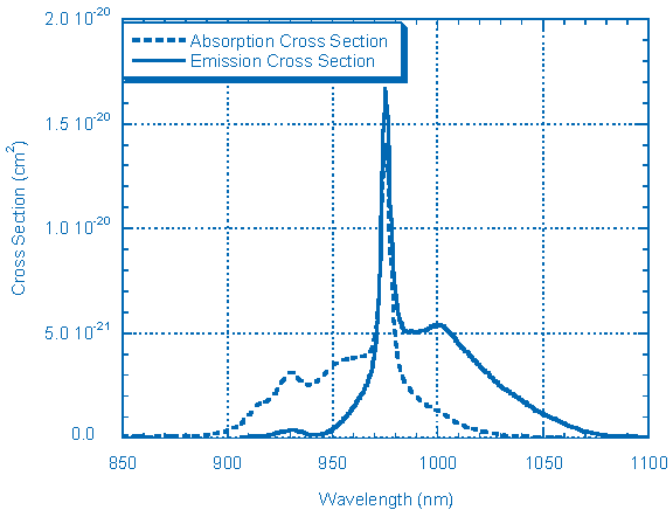
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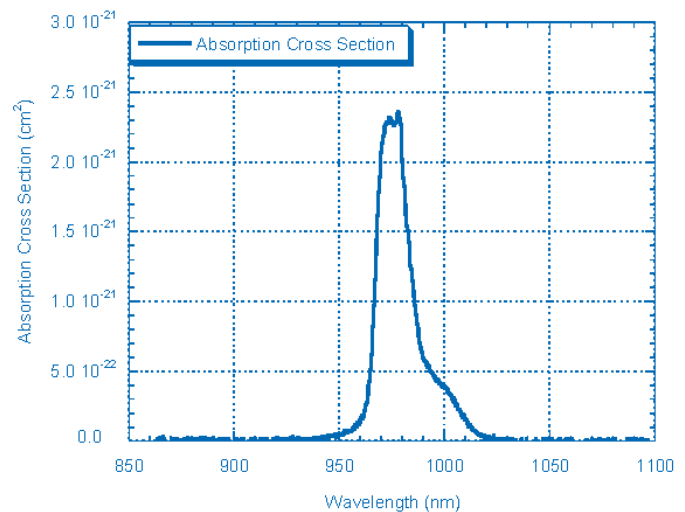


Erbium Absorption and Emission Cross Sections around 1540nm

Ytterbium Absorption and Emission Cross Sections around 980nm



Erbium Absorption Cross Section around 980nm



For more information please contact:

Advanced Optics
SCHOTT North America, Inc.
400 York Avenue
Duryea, PA 18642
USA

Phone: +1 (0) 570/457-7485
Fax: +1 (0) 570/457-7330
info.optics@us.schott.com
www.us.schott.com/advanced_optics

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