

IOG-10 Silicate Laser Glass

For Ion Exchange Applications

IOG-10 is an alkali-zinc-silicate glass developed for use in passive waveguide devices, which are fabricated by ion exchange in a molten KNO_3 or AgNO_3 salt bath. IOG-10 glass can be codoped with erbium and ytterbium for use in active devices. However, the laser properties of Er/Yb doped IOG-10 are inferior to those realized in a phosphate glass host, such as IOG-1 or IOG-2. IOG-10 devices are discussed in "Ionexchanged waveguide lasers in Er/Yb codoped silicate glass," Appl. Optics, 38 [33] 6879-6886 (1999).

Optical Properties

n_d	1.530
V_d	56.6
$n_{1000 \text{ nm}}$ (calculated)	1.521
$n_{1540 \text{ nm}}$ (calculated)	1.518

Erbium Laser Properties

Emission Maxima, λ (nm)	1536
Emission Cross Section at 1536 nm (10^{-21} cm^2)	5.8
Excited State Lifetime for the 1536 nm Band (ms)	17.8
Max Absorption Cross Section for 980 nm Pump Band (10^{-21} cm^2)	1.0

Ytterbium Laser Properties

Emission Maxima, λ (nm)	1020
Emission Cross Section at 1002 nm (10^{-21} cm^2)	4.5
Excited State Lifetime for the 1002 nm Band (ms)	1.4
Max Absorption Cross Section for 980 nm Pump Band (10^{-21} cm^2)	12.0

• Properties will vary slightly with doping content

Chemical Properties

Weight Loss in 50°C Water [mg/($\text{cm}^2 \times \text{day}$)]	0.001
Acid Resistance SR pH = 0.3 at 25°C	1.0
Alkali Resistance AR pH = 12 at 50°C	1.0
Staining Resistance FR pH = 4.6 100 h at 25°C	0
Climatic Resistance CR Water Vapor at 40-50°C for 30 h	1

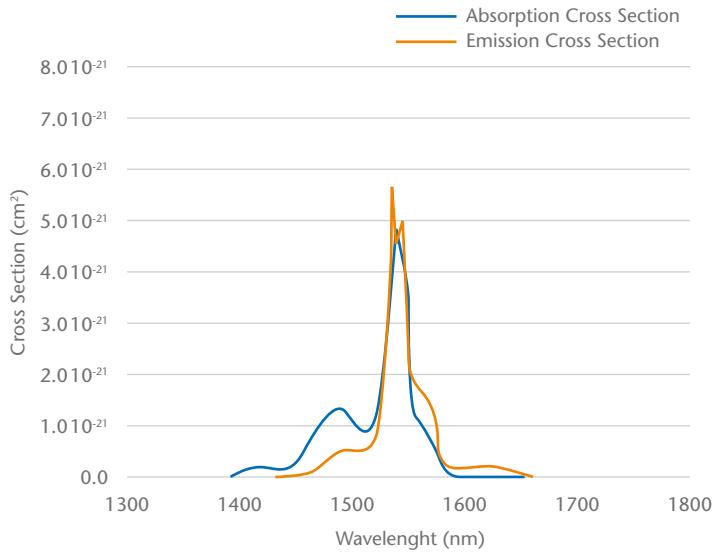
Physical Properties

Density, ρ [g/cm^3]	2.71
Thermal Conductivity (25°C), κ [$\text{W}/\text{m} \times \text{K}$]	0.92
Young's Modulus, E [GPa]	71
Poisson's Ratio, ν	0.24
Fracture Toughness, K_{Ic} [$\text{MPa} \times \text{m}^{1/2}$]	0.71
Knoop Hardness, $\text{HK}_{0.1/20}$	520
Heat Capacity (25°C), C_p [$\text{J}/\text{g} \times \text{K}$]	0.77
Thermal Diffusivity (25°C), σ [$10^{-7} \text{ m}^2/\text{sec}$]	4.4
Thermal Expansion, $\alpha_{20-300^\circ\text{C}}$ [$10^{-7}/\text{K}$]	93
Thermal Expansion, $\alpha_{20-40^\circ\text{C}}$ [$10^{-7}/\text{K}$]	68
Glass Transformation Temperature, T_g (°C)	569

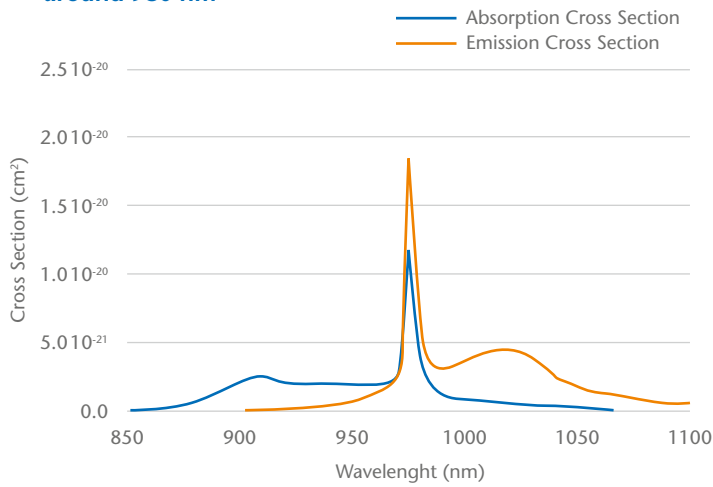
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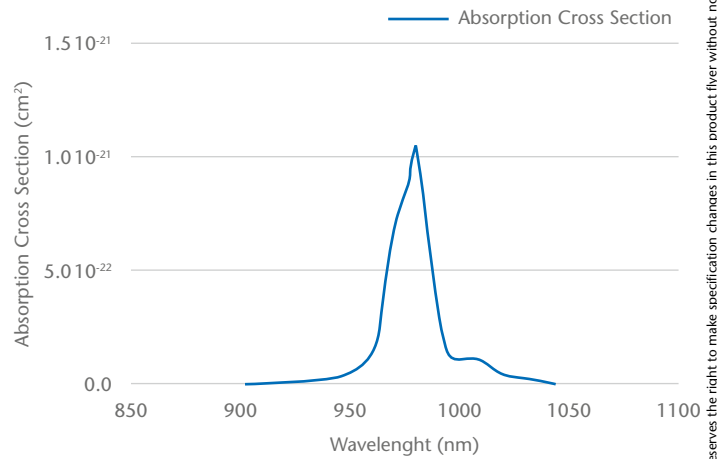
Erbium Absorption and Emission Cross Sections around 1540 nm



Ytterbium Absorption and Emission Cross Sections around 980 nm



Erbium Absorption Cross Section around 980 nm



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