



Glass Products Division

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REAI™ Glass Technology can reduce the *heat burden* in the gain medium of power lasers by as much as 20 %

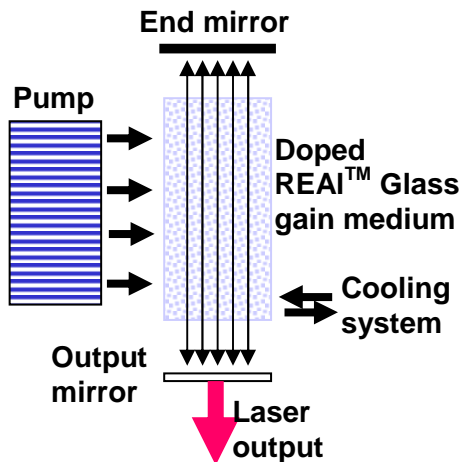
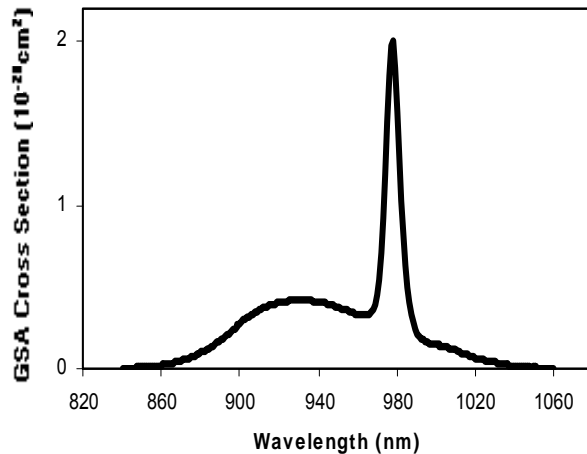
REAI™ Glass doped with trivalent ytterbium (“Yb”) provides extremely strong pump absorption at 980 nm, allowing the pump and laser wavelengths to be much closer than in conventional crystal YAG. Pumping at a wavelength of 980 nm uses low cost diode pumps and greatly reduces heat generation in the laser gain medium compared to pumping at 940 nm. In high power density applications where heat extraction from the gain medium can limit output power, using REAI™ Glass can reduce the heat burden by as much as 20%. CRI is seeking development partners to introduce the new laser products to established IR laser markets and expand the application of solid state lasers.

MARKETS

The customer need satisfied by the CRI’s REAI™ Glass technology is enabling smaller, more efficient high power density infrared laser components. Using REAI™ Glass can expand the application of lasers in materials processing and the emerging military and medical markets.

FEATURES

Ground-state absorption cross section of Yb³⁺ in REAI™ Glass. Note the strong, broad absorption at ~980 nm where the glass can be optically pumped. >



< Diagram showing the essential components of a laser. The doped REAI™ Glass gain medium can be tailored to a variety of specifications and made in rod, slab, disk or fiber forms.

Using REAI™ Glass for the gain medium in a power laser provides technical and economic advantages over using conventional crystalline YAG while retaining the most desirable qualities of YAG as a host material. Compared to crystalline YAG, REAI™ Glass provides:

- Higher conversion efficiency
- Easier fabrication
- More efficient pump utilization
- An optically homogeneous gain medium



< REAI™ Glass laser disks and as-cast preform.

REAI™ Glass is available in a variety of forms including rods, slabs, disks and fibers. The composition and properties can be optimized for specific power laser applications with dopant concentrations as high as 50 %.

Property	Range of values
Major components	Al ₂ O ₃ , RE ₂ O ₃ *, 0-35 mole % SiO ₂
Solubility of rare earth oxides	Up to 50 mole % RE ₂ O ₃
Infrared transmission	4000 to 5000 nm
Fluorescence lifetime of Yb ³⁺	0.7-0.8 ms
Refractive index (n _D , λ = 589 nm)	1.7-1.8
Hardness	800-1000 Vickers
Devitrification temperature	1000-1100 °C
Thermal expansion coefficient	~10 x 10 ⁻⁶ /°C
Thermal conductivity	0.01 W/cm.K
Density	3.4-4.1 gram per cm ³
Young's modulus	110-135 GPa
Chemical stability (in water at 90 °C)	Excellent, dissolution <1 x 10 ⁻⁸ g/cm ² /min

*Oxides of elements: Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu.
U.S. Patent No. 6,482,758 issued November 19, 2002.

Products available exclusively from CRI

Additional Information

For more information on infrared transparent REAI™ Glass, contact:

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