

Directly Diode-Pumped Yb:Glass Regenerative Amplifier

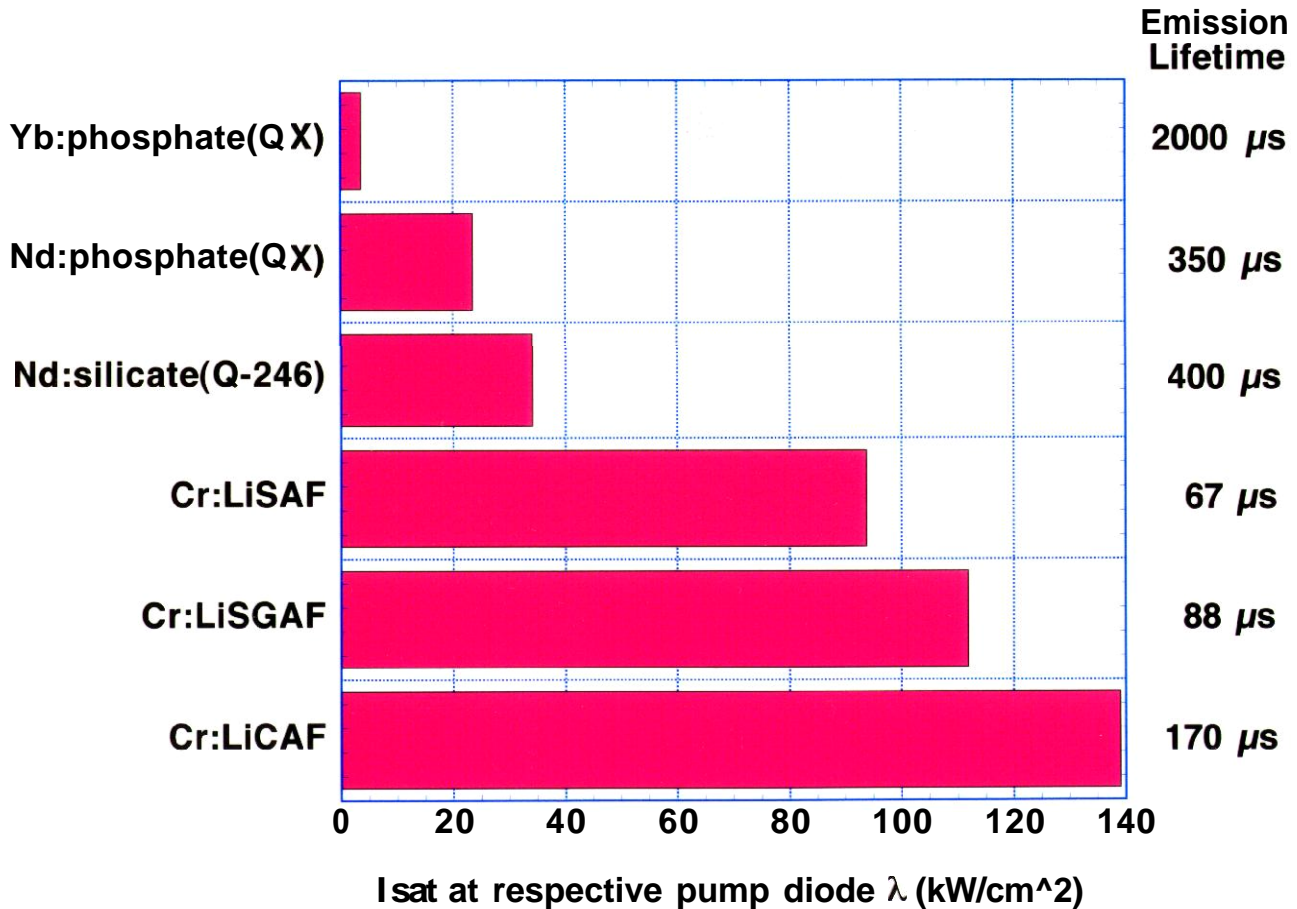
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Directly Diode-Pumped Yb:Glass Regenerative Amplifier

**Goal: Produce a reliable, compact, high-average-
power, 100-fs laser source**

Pump Intensity Requirements for Potential Directly-Diode-Pumped, 100-fs, mJ Sources



Yb:Glass - Well Suited for Direct Pumping by Long-Lasting InGaAs diodes

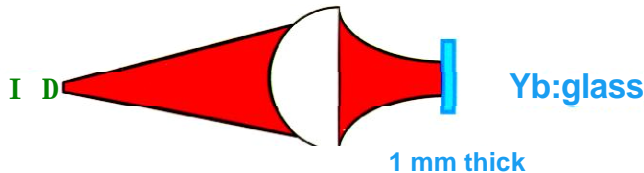
Long Lifetime



Low Pump Saturation Intensity

4 kW/cm² @ 975 nm

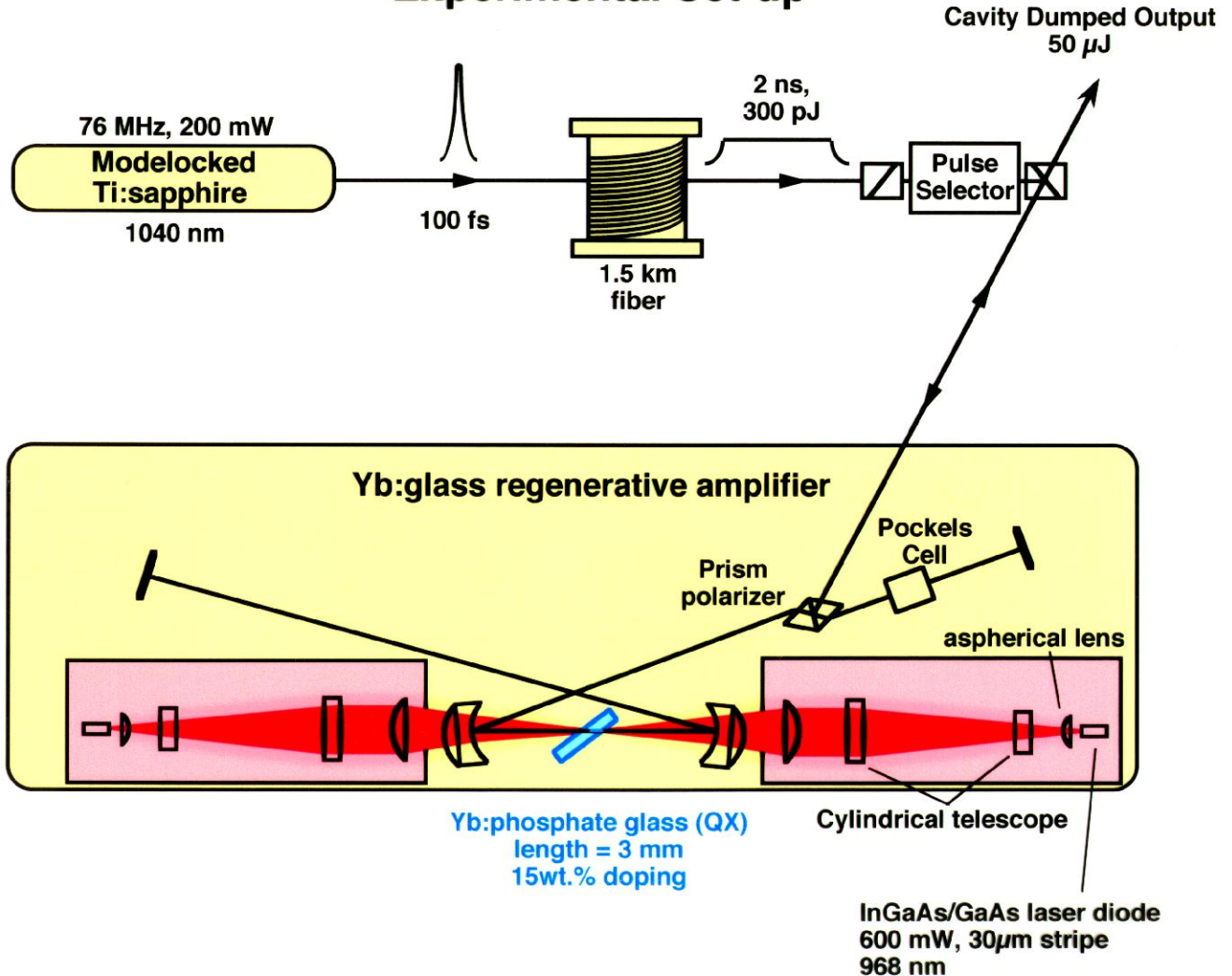
InGaAs Laser Diode



Reliable diodes (Al free)
High-power bars/arrays
 $\lambda = 940 - 1000 \text{ nm}$

Thin Slab - Easy to remove heat
High doping density ($> 10^{21}/\text{cm}^3$)
High energy storage ($> 100 \text{ J}/\text{cm}^3$)
Small quantum defect (7%)

Experimental Set-up



Conclusions

Yb:glass pumped by InGaAs high-power laser diodes offers a potentially reliable source for precision machining and laser surgery.

Demonstrated 40 μ J at 800 Hz with 12 nm of bandwidth from a directly-diode-pumped Yb:glass regenerative amplifier.

Future Direction

Increase average power and pulse energy from Yb:glass system. H. Liu, et al. has demonstrated 1-mJ at 250 Hz from a Q-Switched Yb:glass laser pumped with 20 W InGaAs diode bars. CTuM67

Investigate Yb-doped crystals and fibers as possible sources.