

High Performance Laser Diodes for Quantum Technology Applications

April 22nd, 2022

Quantum Technology

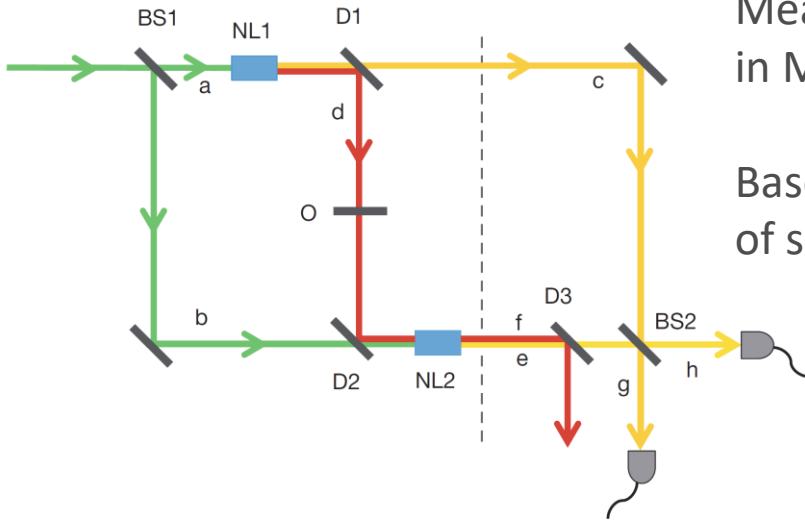
QUANTUM
SENSING

QUANTUM
METROLOGY

QUANTUM
NETWORKING

QUANTUM
COMPUTING

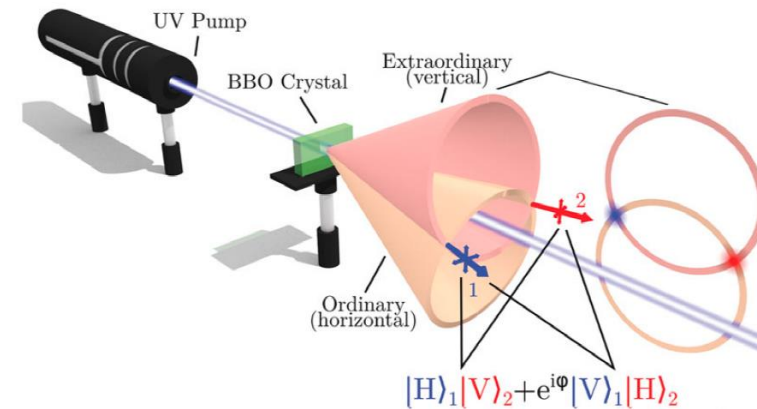
Quantum Imaging



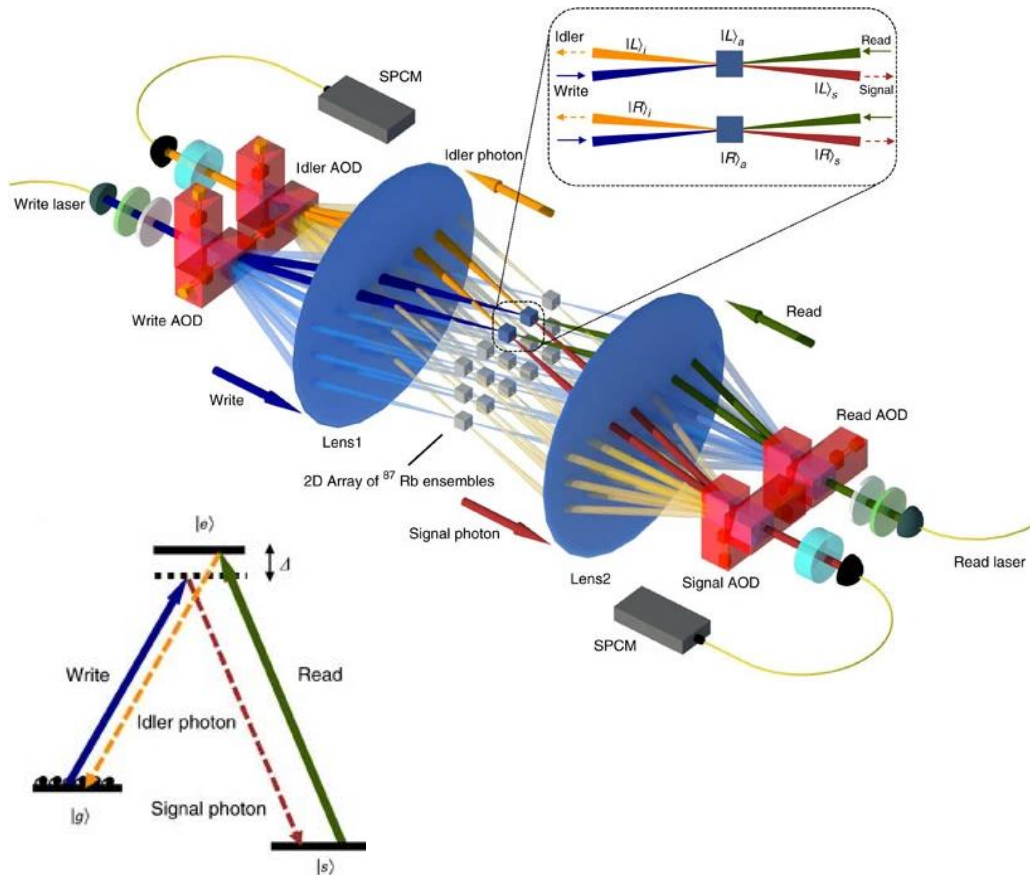
Measurement with undetected photons → spectroscopy and microscopy in MIR range without need of sources and detectors in this range.

Based on generation of entangled photon pairs by the quantum optical effect of spontaneous parametric down-conversion.

A laser is focused into non-linear crystal to create spectral and spacial entangled photon pairs.



Quantum Communication



Global quantum communication networking requires quantum memories.

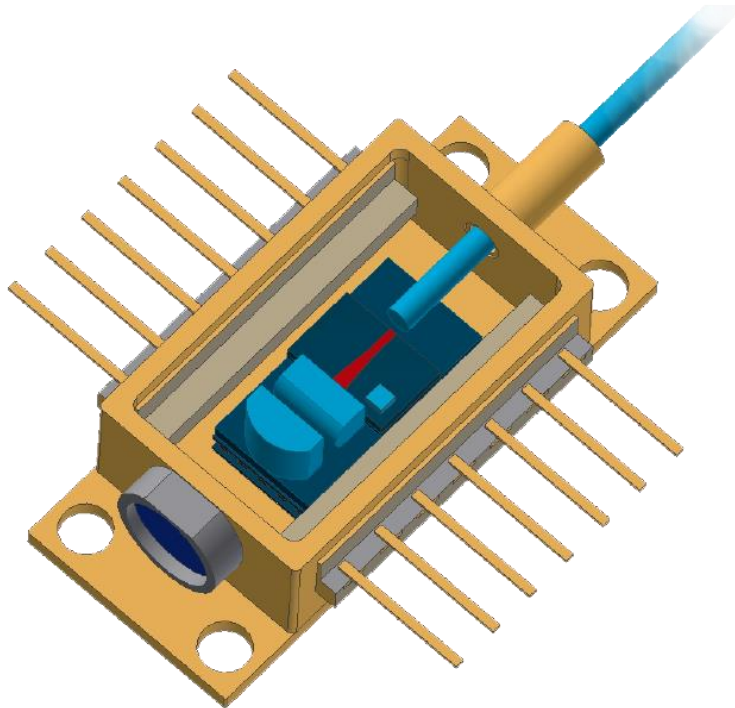
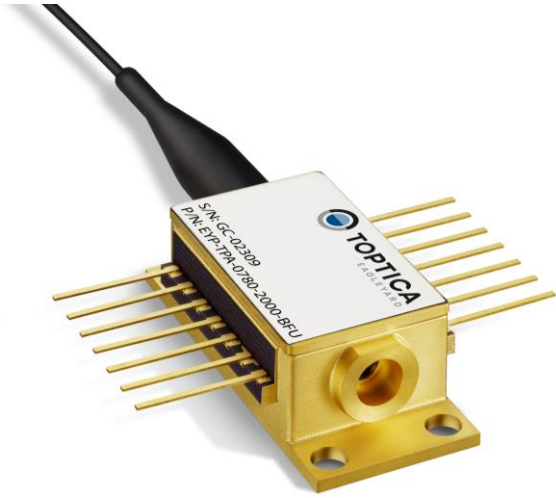
Transfer specific property from photon to atom and map it back into a photon.

Use of single atom or an ensemble → tested with several systems, such as BECs, next generation is warm vapor

Tapered amplifier in butterfly package (TPA-BFU)

Features

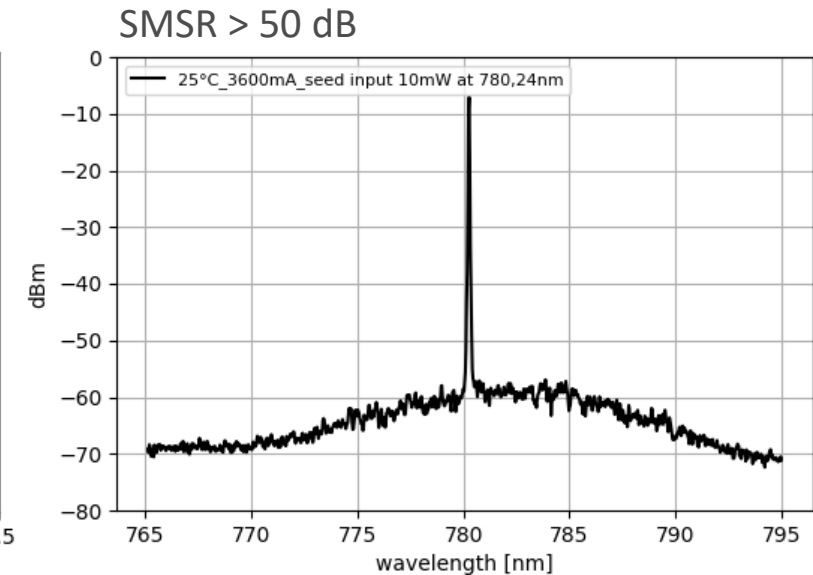
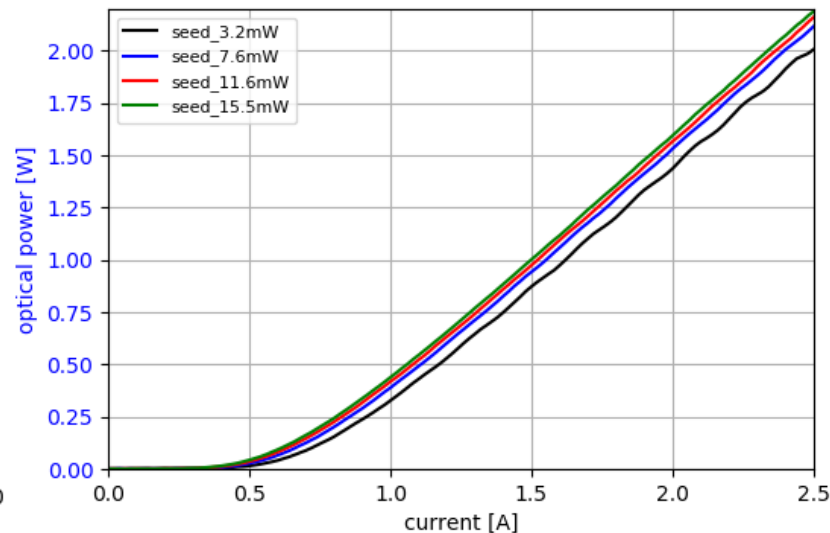
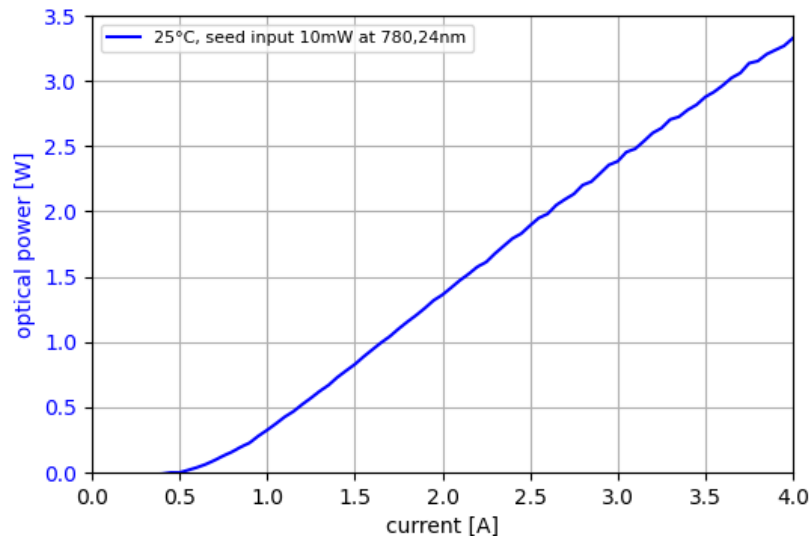
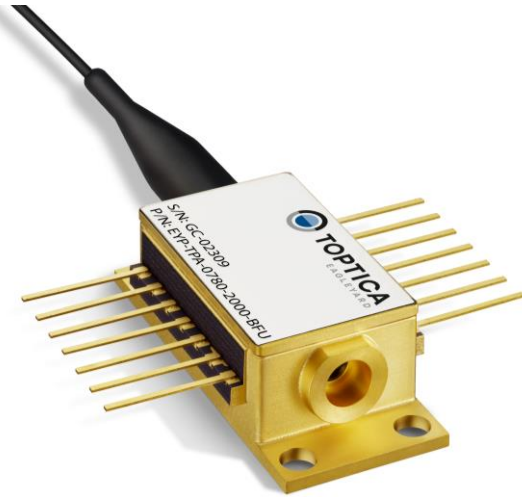
- Amplifier for (transversal) single mode lasers
- Thermoelectric cooler and thermistor integrated
- Standard butterfly package with PM fiber input
- Different seed lasers possible (DFB, mini-ECL, ...)



Tapered amplifier in butterfly package (TPA-BFU)

Benefits

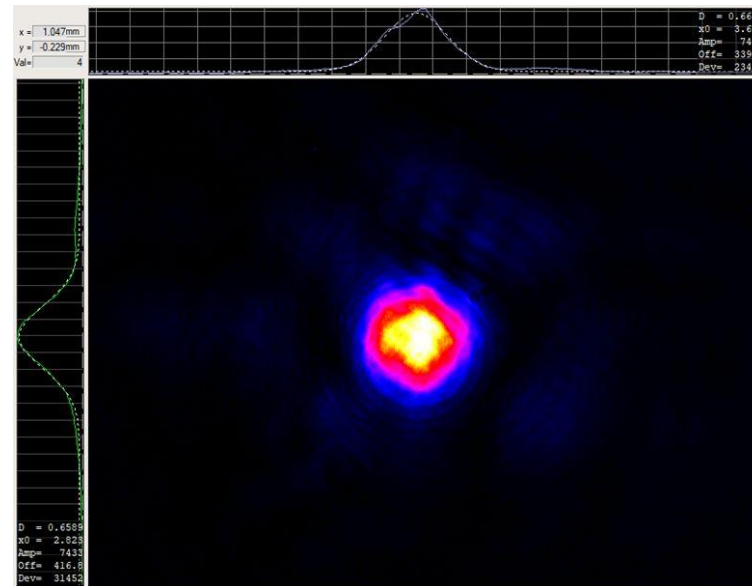
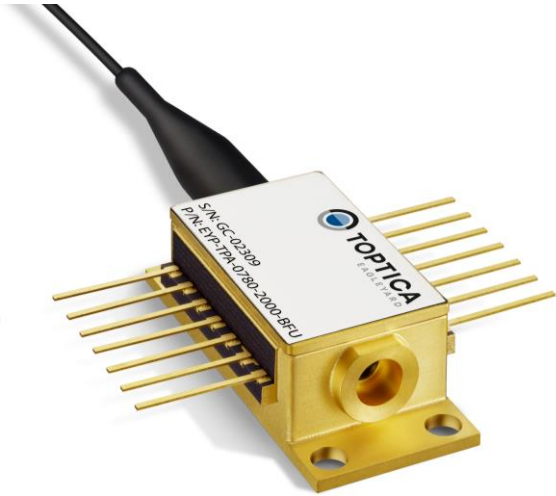
- High power of 3W@780nm and 2W@850nm
- Low saturation power from seed module due to high coupling efficiency
- In principle complete eyP wavelength range feasible, currently 780 nm and 850 nm



Tapered amplifier in butterfly package (TPA-BFU)

Benefits

- Collimated gaussian beam profile (M^2 1.3 – 1.7, divergence $\sim 0.1^\circ$, beam width ($1/e^2$) 0.7 mm)
- Linewidth 100 kHz to several 10 kHz*



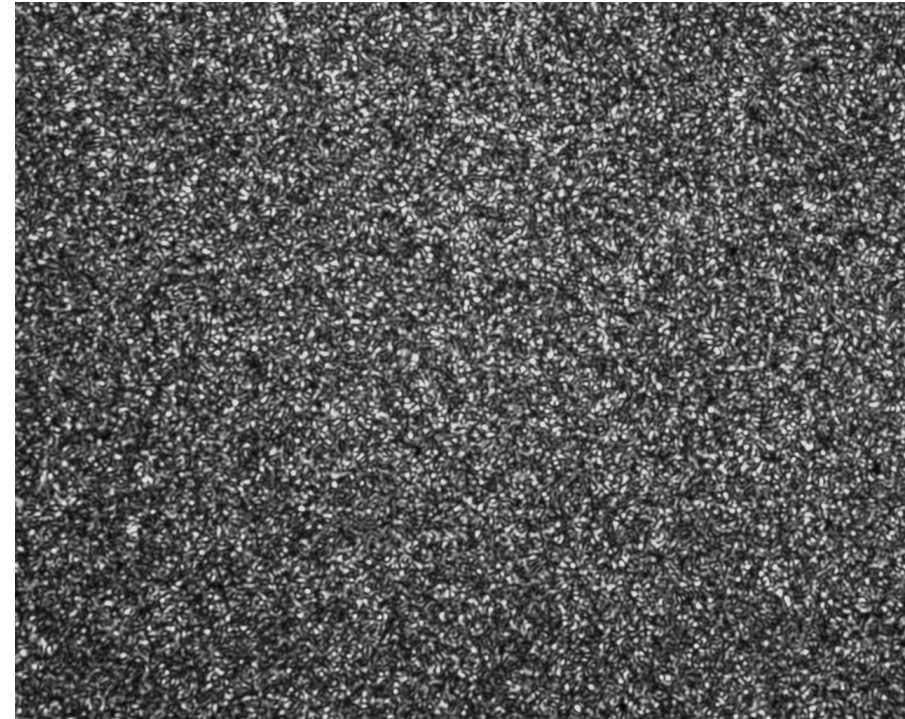
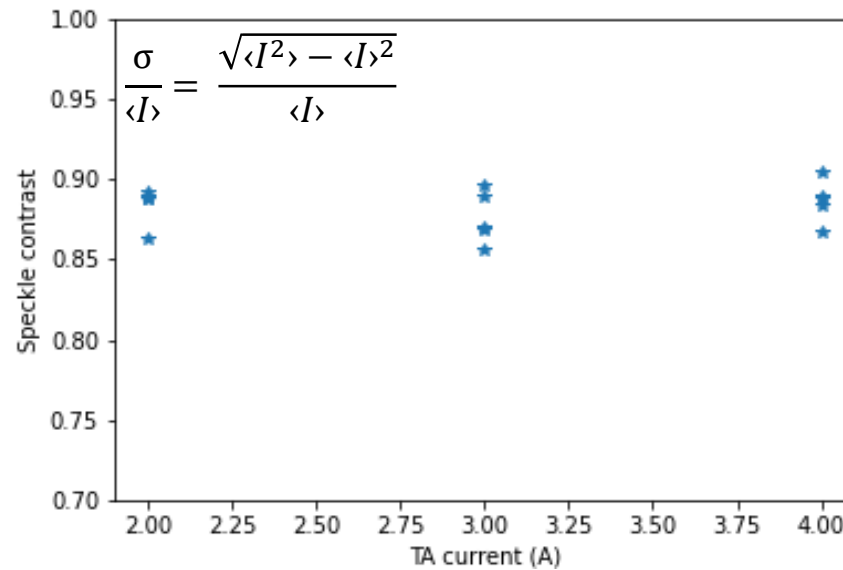
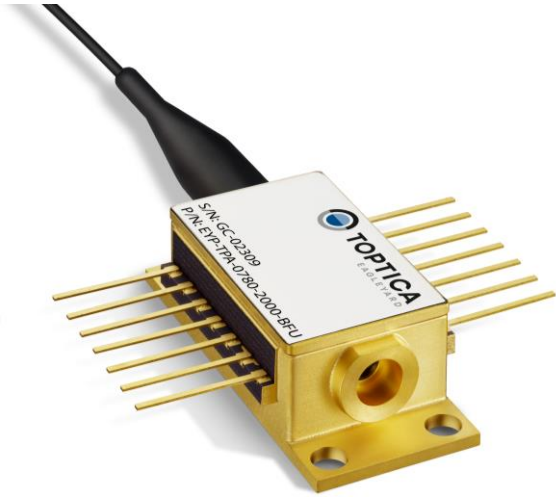
L = 600mm; I_TA = 3600mA; T_TA = 25°C P_seed = 10mW @780.25nm

*inherited from seed laser

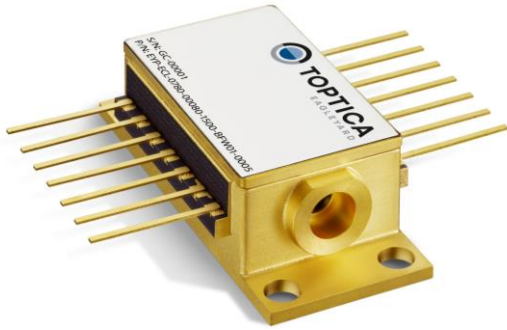
Tapered amplifier in butterfly package (TPA-BFU)

Benefits

- Speckle contrast measurement → high coherence

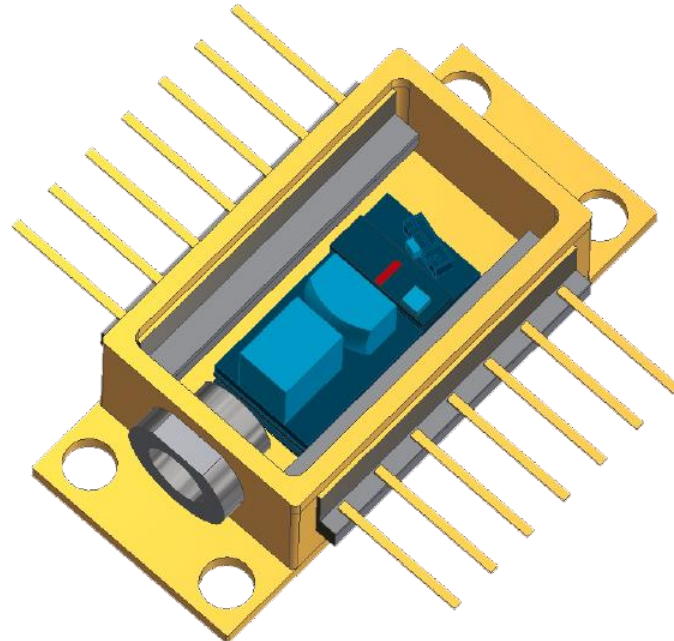


Mini-ECL



Features

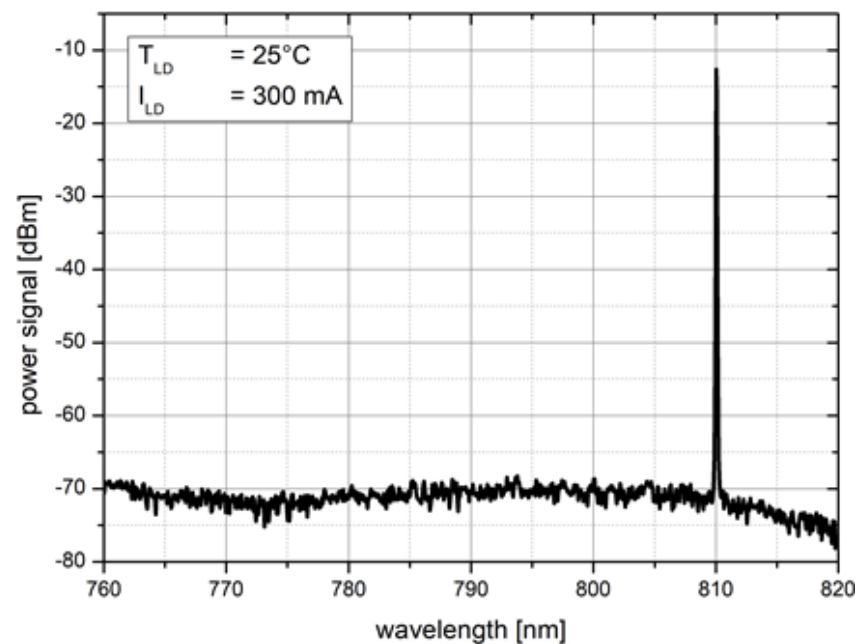
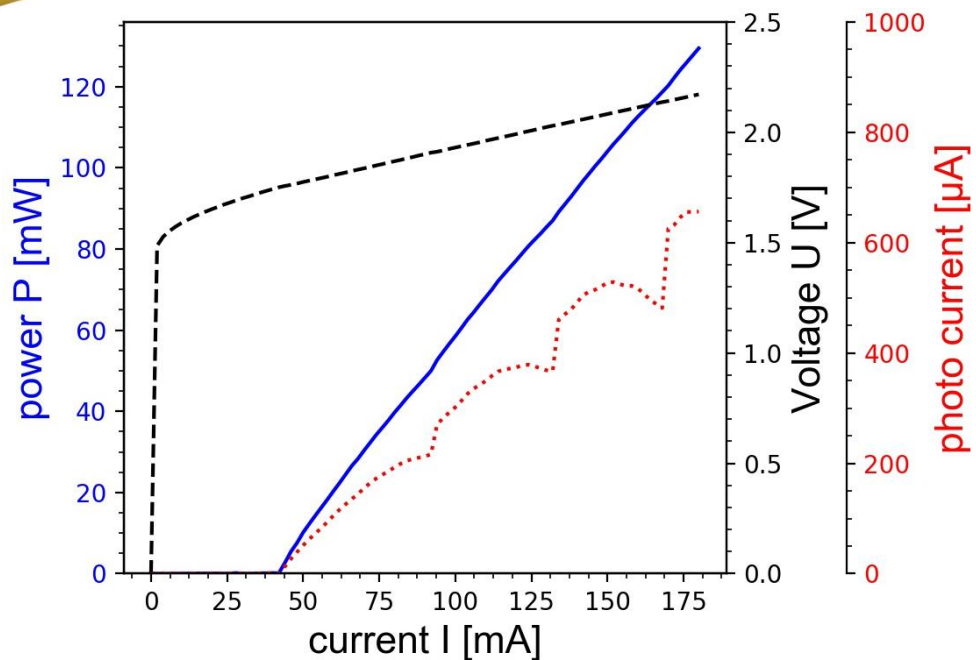
- AR coated ridge waveguide chip coupled to volume bragg grating
- Thermoelectric cooler and thermistor integrated
- Hermetic standard butterfly package
- In principle complete eyP wavelength range feasible, currently 780 nm, in particular 780.24 nm (RbD2)
- Option: single or double isolator, fiber output coupling possible and further wavelengths 810 nm, and 894 nm, in particular 894.5 nm (CsD1)



Mini-ECL

Benefits

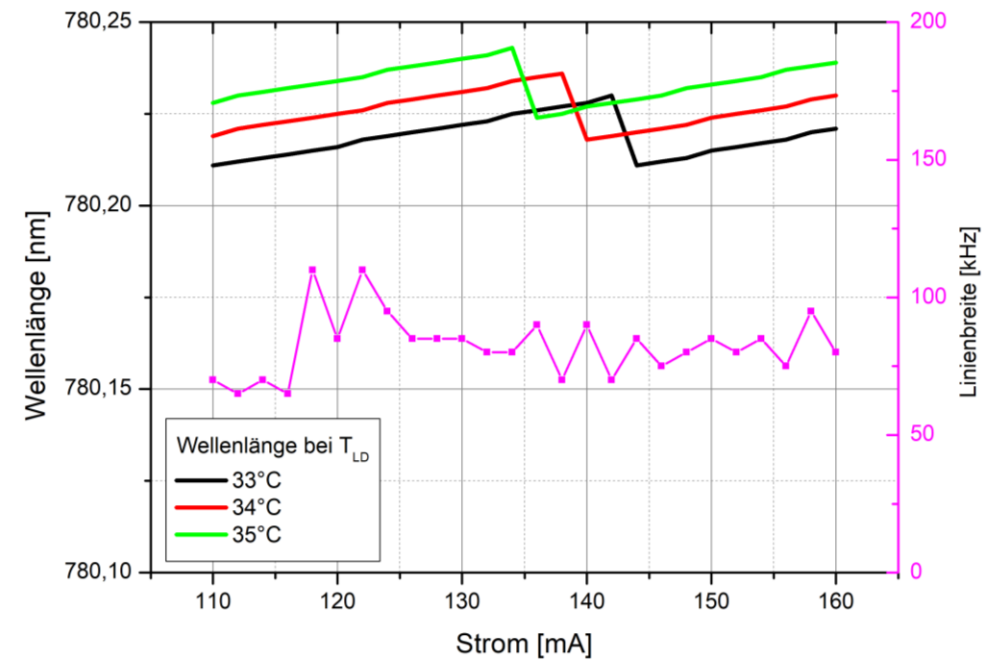
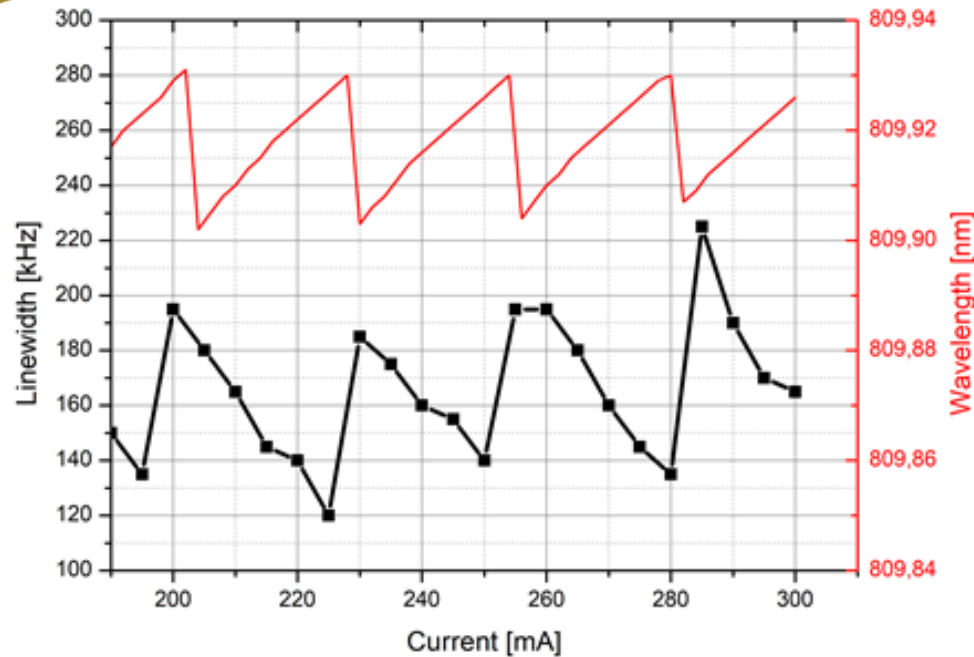
- Output power of up to 120 mW (780 nm)
- SMSR > 50 dB



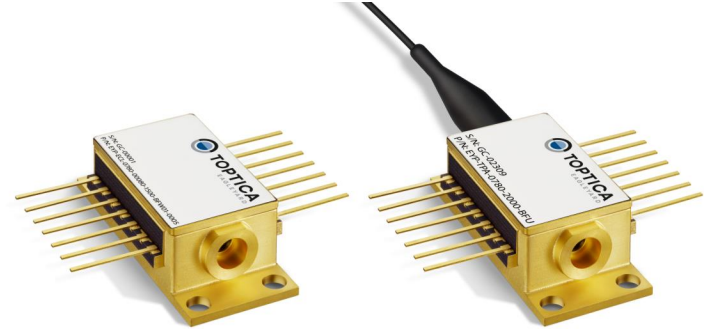
Mini-ECL

Benefits

- Linewidth of ~ 100 kHz and up to 10 GHz mode hop free tuning range
- With electronic stabilization linewidths of at least two orders of magnitude less feasible

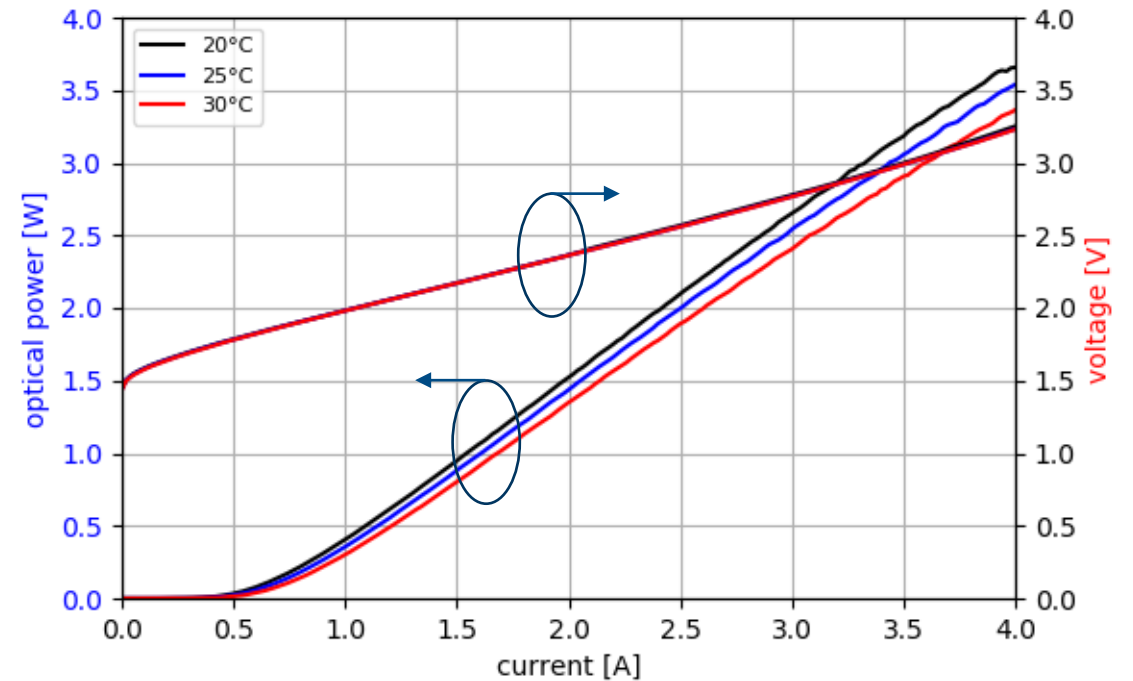
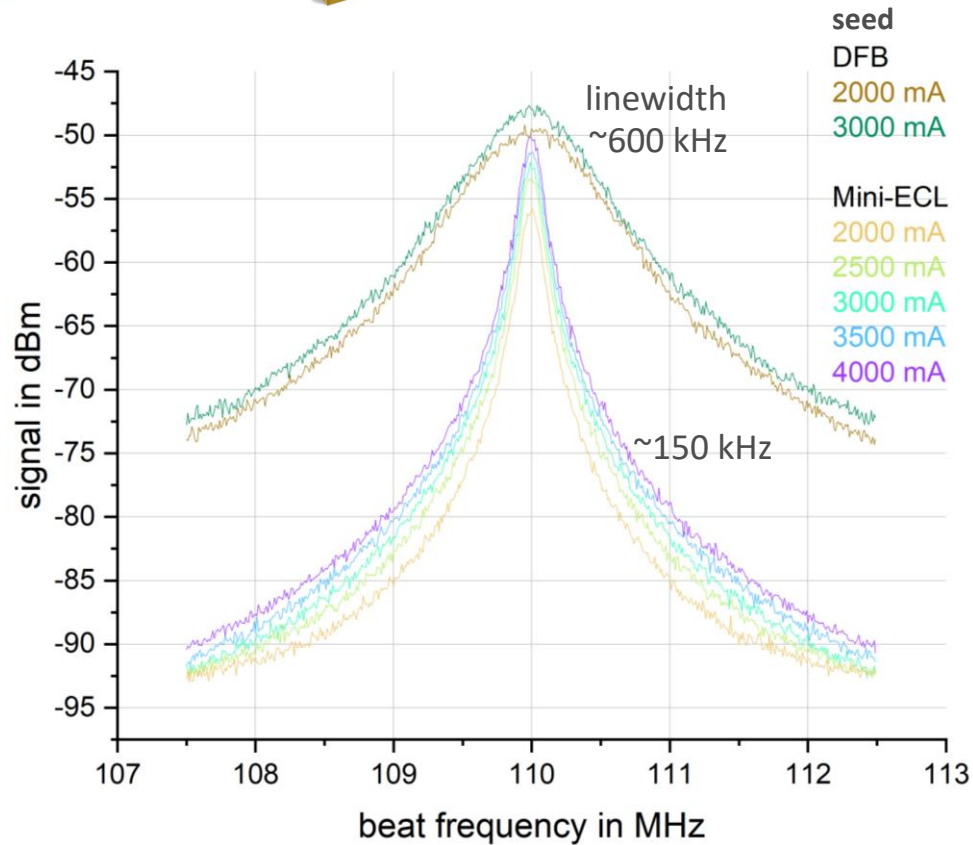


TPA-BFU + mini-ECL

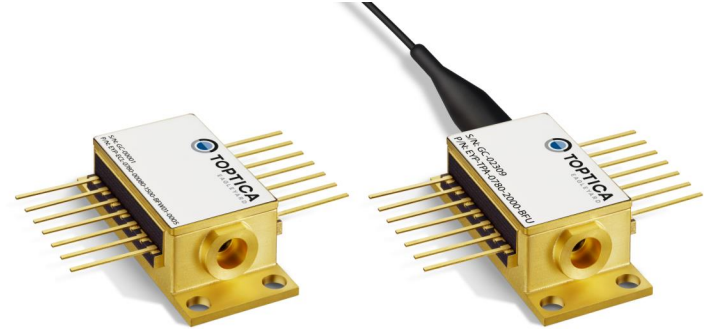


Benefits

- Mini-ECL with double stage isolator and fiber output coupled to TPA-BFU
- Combines low linewidth of Mini-ECL and high power of TPA-BFU



TPA-BFU + mini-ECL




More information

- Available products
mini-ECL (EYP-ECL-0780-00080-1500-BFW01-0005)
Tapered Amplifier @ 780 nm (EYP-TPA-0780-03000-4006-BFU09-0000)
Tapered Amplifier @ 850 nm (EYP-TPA-0850-02000-4006-BFU09-0000)
- Check out more products at www.toptica-eagleyard.com
- Follow us on LinkedIn to get informed

We are available for you locally through our sales partners, please feel free to get in contact if you have questions.

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