New Laser Stack Generation with FAC Option for Applications in Space

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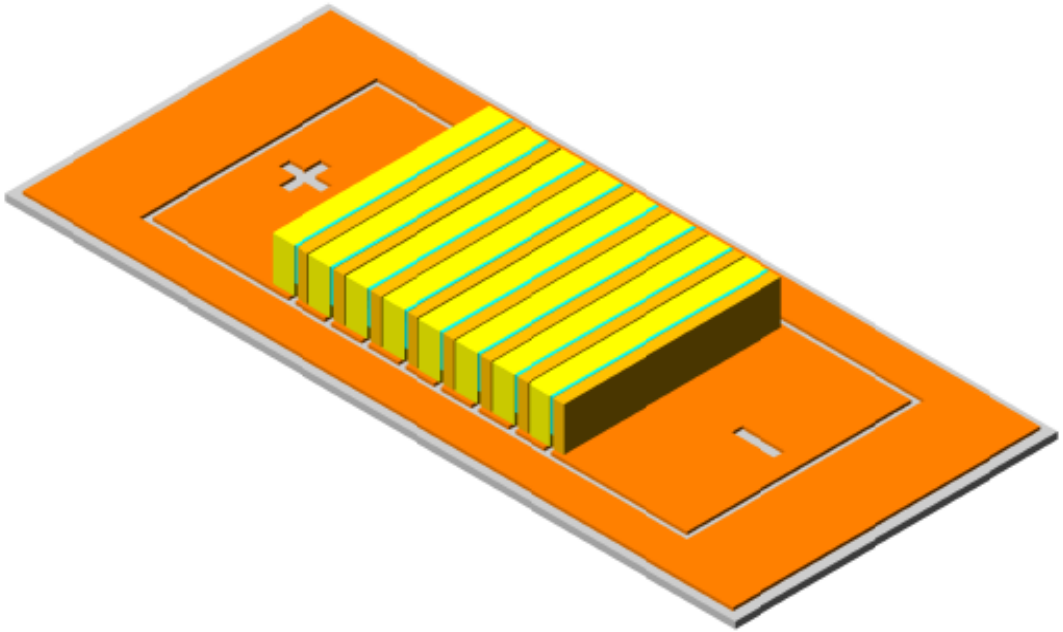
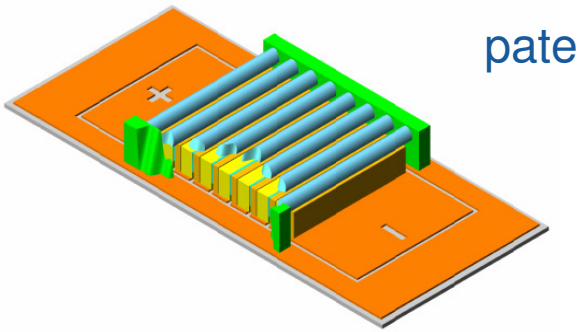
Outline

- Concept
- Laser bars / performance
- Stack performance
- FAC option
- Application

New Laser Stack Generation

- Passively cooled
- Space compatible and lightweight materials
- Thermal expansion matched materials
- Designed for long lifetime
- Scalable output power
- Design compatible to FAC due to increased bar-to-bar pitch





patent pending

Semiconductor laser bars from JENOPTIK Diode Lab

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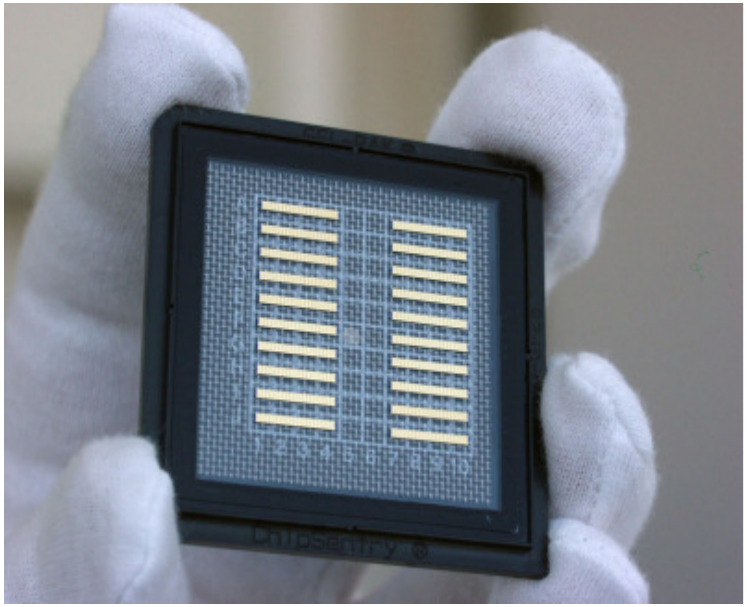
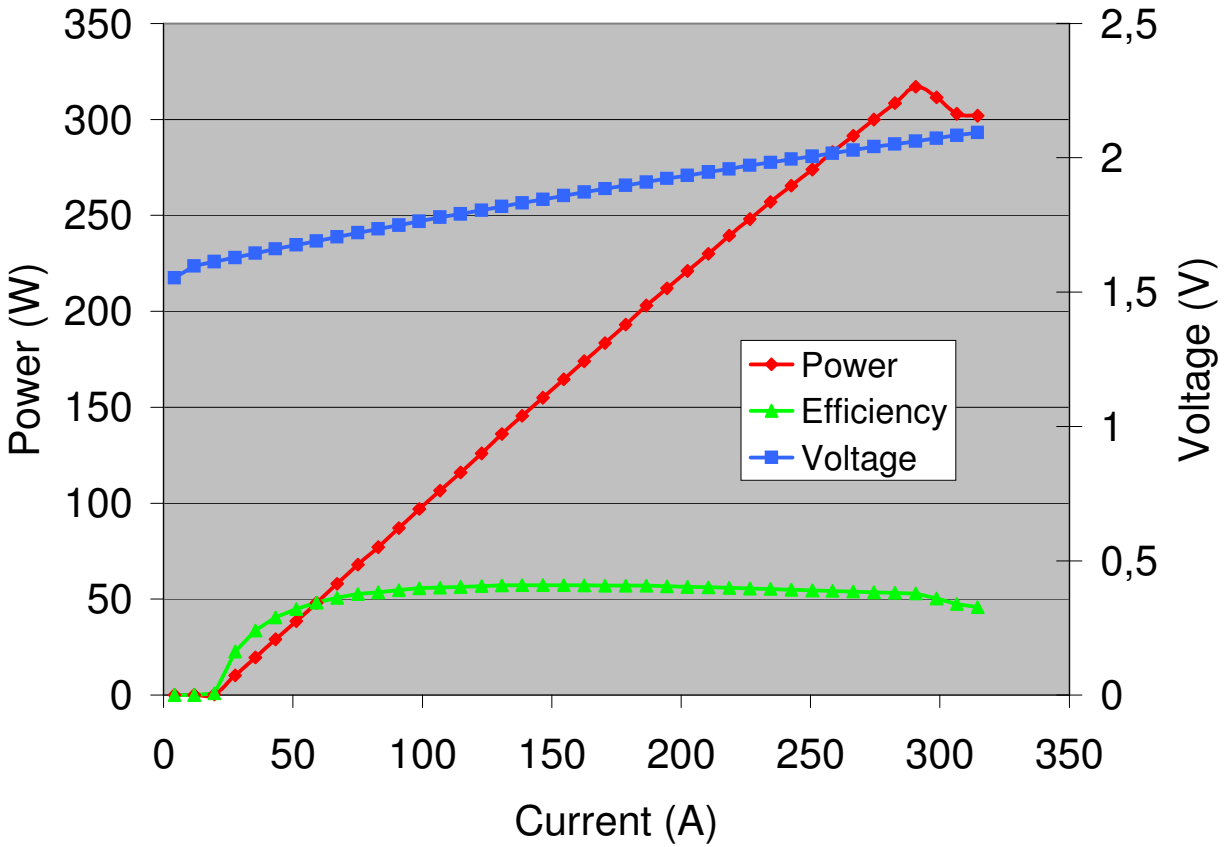
Characteristics:

- High eo efficiency: > 50%
- High COD – Level: > 50 mW/µm
- Small beam divergence: FA (FWHM): 27°
  FA (95%): 46°
  SA (FWHM): 5-6°
  SA (95%): 6-7°
- Low degradation rate: < 1% per 1000 h
- Random failures: < 0.1% (bar based)
- Operation conditions: cw, switched cw, qcw



Performance Bar

808nm, 1.5mm, 50% ff, qcw (200µs, 10ms, 2%d.c.), 25°C

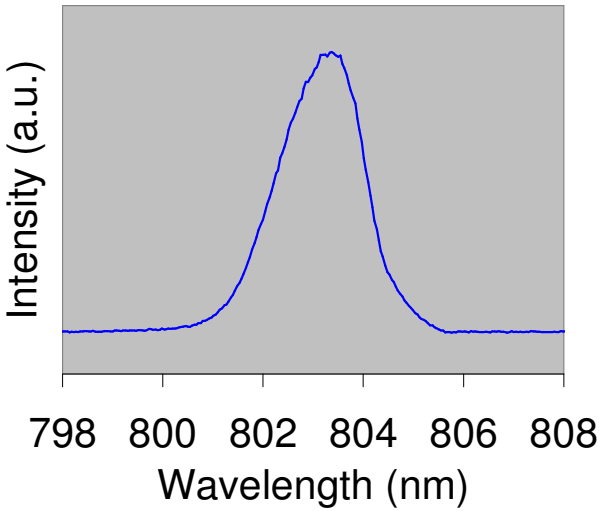


Slope: 1.22 W/A

I_{th}: 19 A

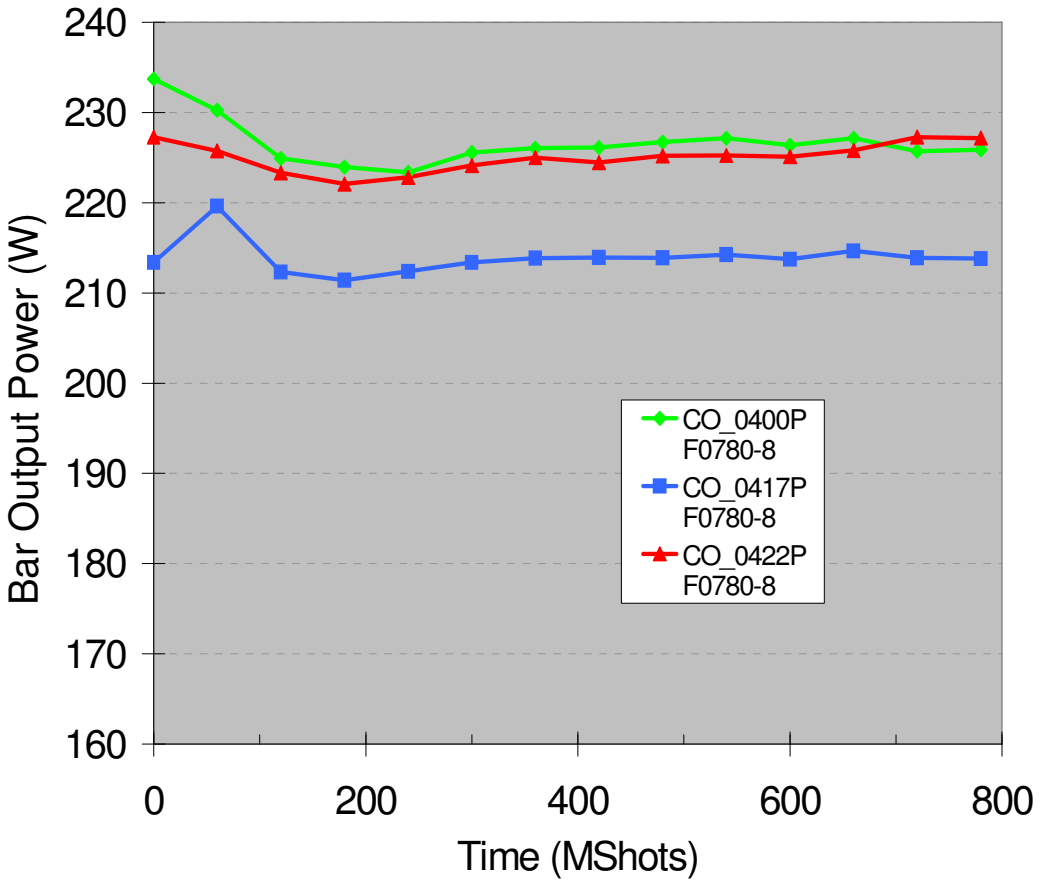
P_{COD}: 317 W

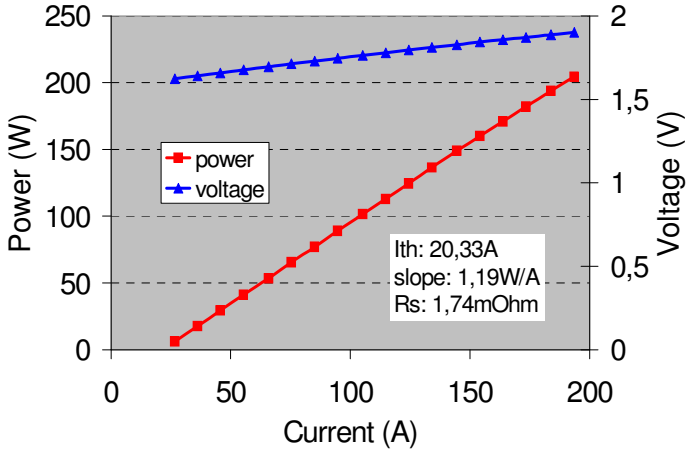
COD-Level: 67 W/mm

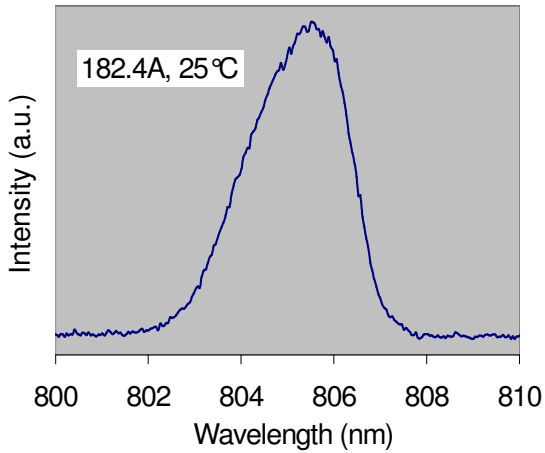


Lifetest (ongoing)

808nm, 1.5mm, 50% ff, qcw (300µs, 15ms, 2%d.c.), 25°C

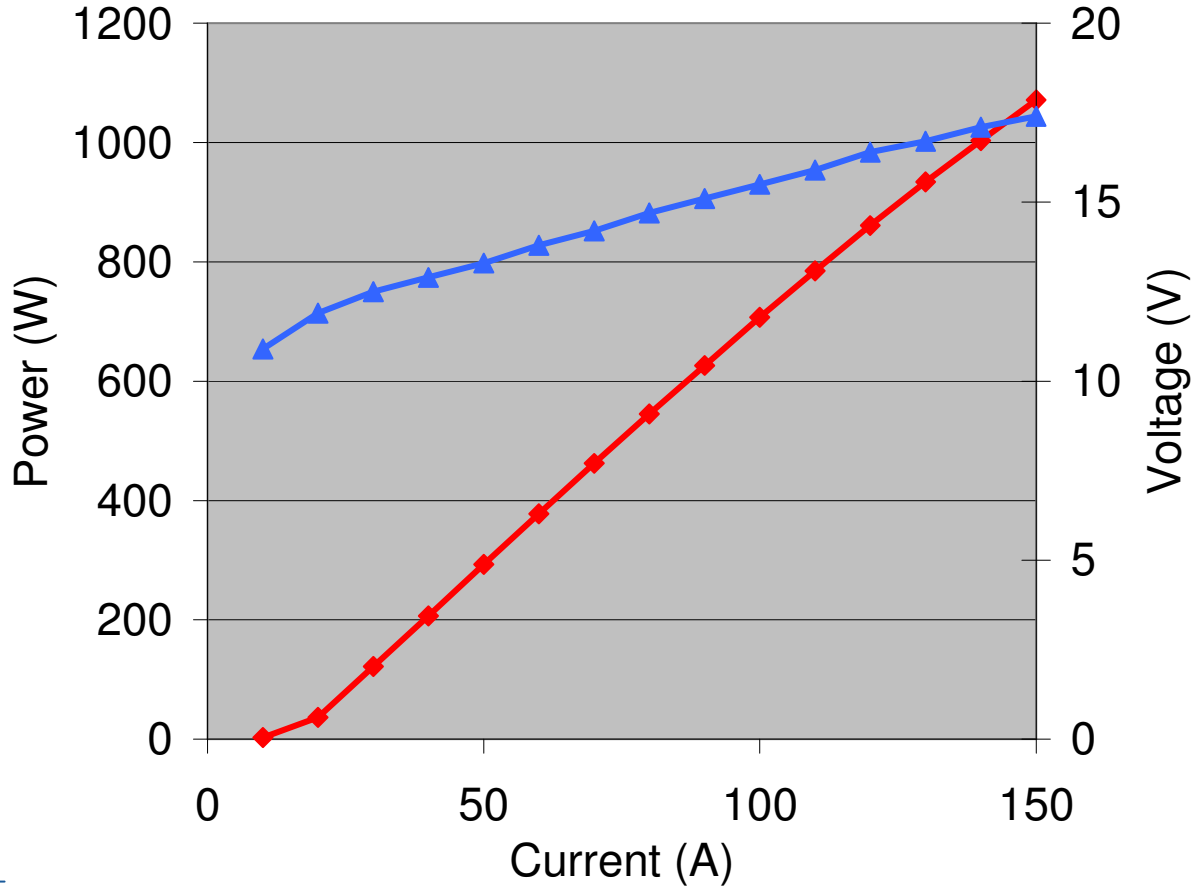






Performance Stack

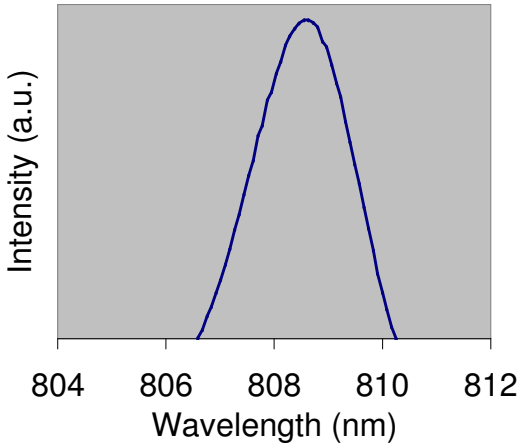
8 bars, 808nm, 1.5mm, 50% ff, qcw (200µs, 10ms, 2%d.c.), 25°C



I_{th}: 18 A

Slope: >8 W/A

P @ 150A: >1kW



FAC Option

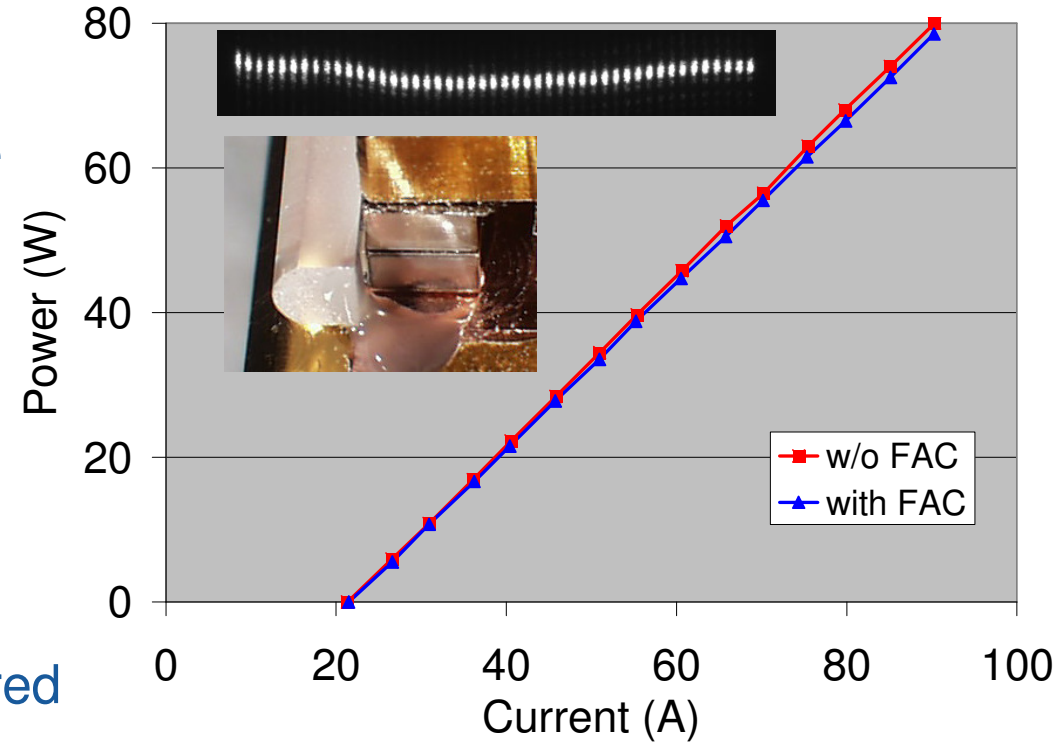
Technique available for actively cooled stacks

Not space compatible yet

Challenges on gluing technique

- Space compatible
- Outgasing
- Thermal cycles
- Shock and vibration tests
- Radiation test
- Alignment
- Long-term stable

Space compatible lenses required



Pump Laser Modul for ATLID EarthCARE Mission

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Development and assessment of long lifetime high-power laser diodes arrays

- 700 W
- 808 nm
- qcw (200µs, 100Hz, 2%d.c.)
- conductively cooled
- 10 Gshots (3 years @ 100Hz)
- option for FAC