ALUVIA Photonics

Revolutionizing photonic integrated circuits with Al_2O_3 technology

Mar 2025

ALUVIA PHOTONICS

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COMPANY OVERVIEW

Company: ALUVIA Photonics B.V.

Founded: mid-2022 as a spin-off of University of Twente

Business model: PIC manufacturer

Team:

Founders - Sonia Garcia Blanco (CSO), Ward Hendricks (CTO)

CEO – Steve Stoffels, Operations – Michiel de Goede

Commercial status: PIC and wafer sales

Production capacity:

4 inch – Mesa+ Nanolab (>100 wfrs/year)

8 inch – Sputtering instrument ordered

– Active discussions with tier-1 CMOS foundries

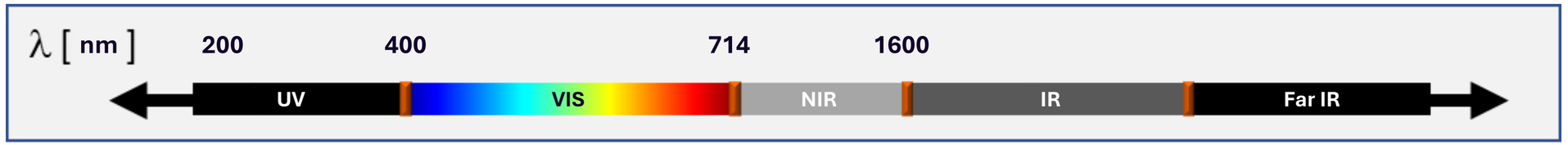
TWENTE PIC ECOSYSTEM

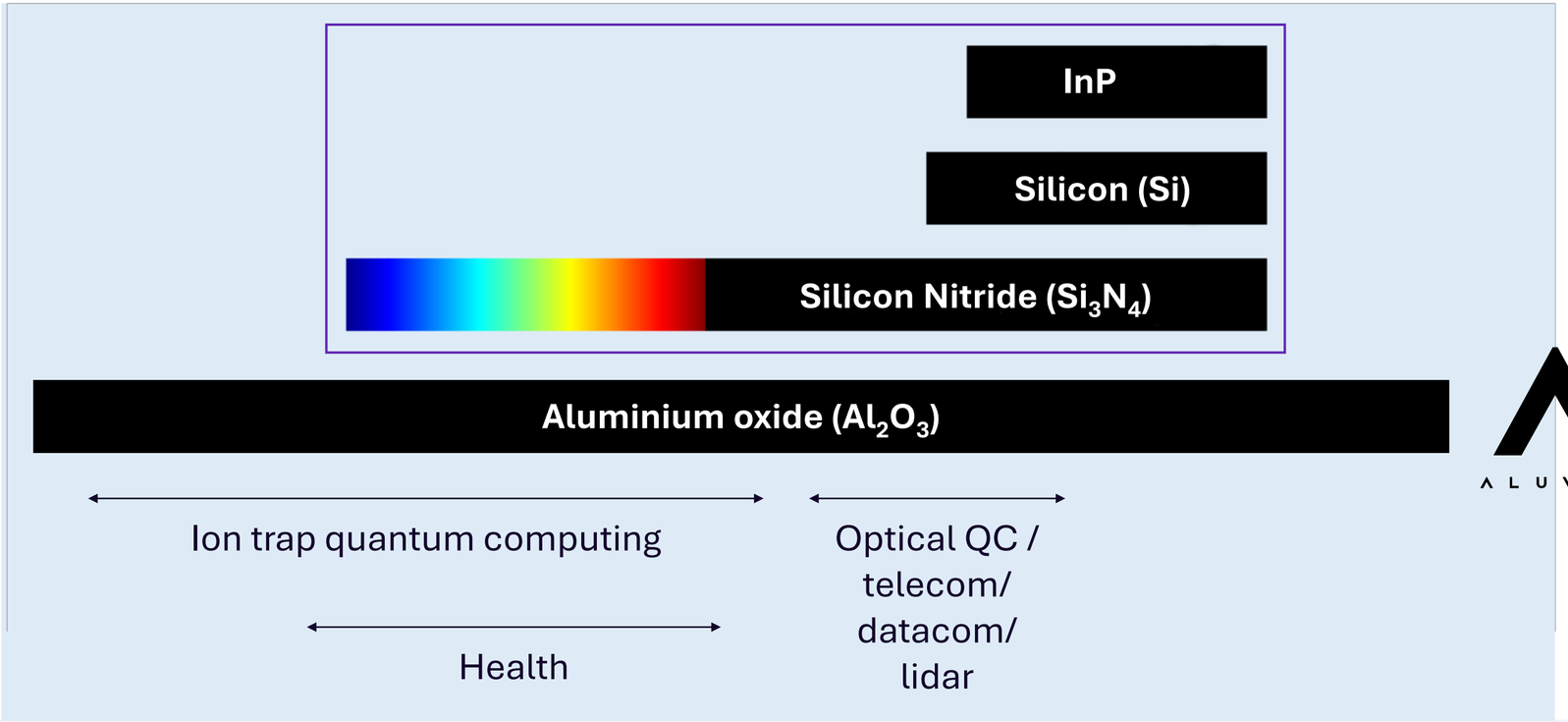
FULL SUPPLY CHAIN FROM DESIGN TO PACKAGING

THE AL_2O_3 PIC PLATFORM

BROAD OPERATING SPECTRAL WINDOW + ON-CHIP AMPLIFICATION

UV:
Lack of a commercial PC platform





ALUVIA

World-leading low losses*:

- 1-5 dB/m @ 1550 nm
- ~1 dB/cm at 405 nm

Integrated amplification

Only integrated material with 20 dB fiber-to-fiber net gain and over 30 dB of internal net gain when doped with erbium

*Depending on cross-section

ALUVIA'S OFFERING

VALIDATED PICs IN THE Al_2O_3 INTEGRATED PHOTONIC PLATFORM

- Enable broadband operation from UV till mid-IR
- Optical amplification by rare-earth doping

Design partners

LUCEDA PHOTONICS

epiphany PHOTONIC DESIGN HOUSE

VLC PHOTONICS

ALUVIA

MPW (multi project wafer runs): PASSIVES

- 100 nm thick (UV-VIS)
- 400 nm thick (near IR)
- Every 3 months

Dedicated runs: PASSIVES and ACTIVES

PIC-EDWA demo kit

Packaging

phix

WHY Al_2O_3?

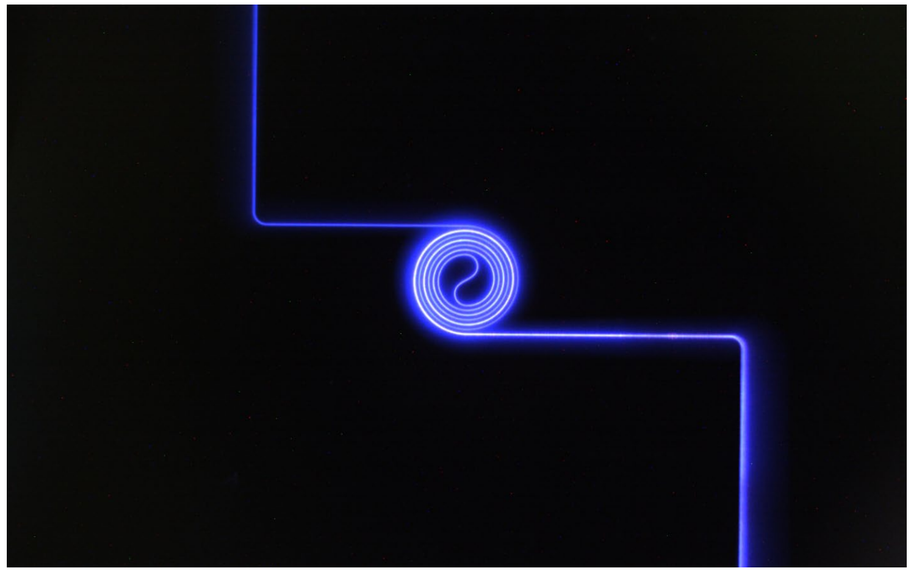
ADVANTAGES OF ALUVIA'S ALUMINIUM OXIDE PLATFORM

- Large transparency window: UV-mid-IR
- Low propagation losses: 1-5 dB/m @1550 nm*
- High rare-earth ion solubility
- Moderate refractive index: ~1.72 @1550 nm
- Wafer level deposition by RF reactive sputtering: manufacturability
- High linearity and high power handling

*Depending on cross-section

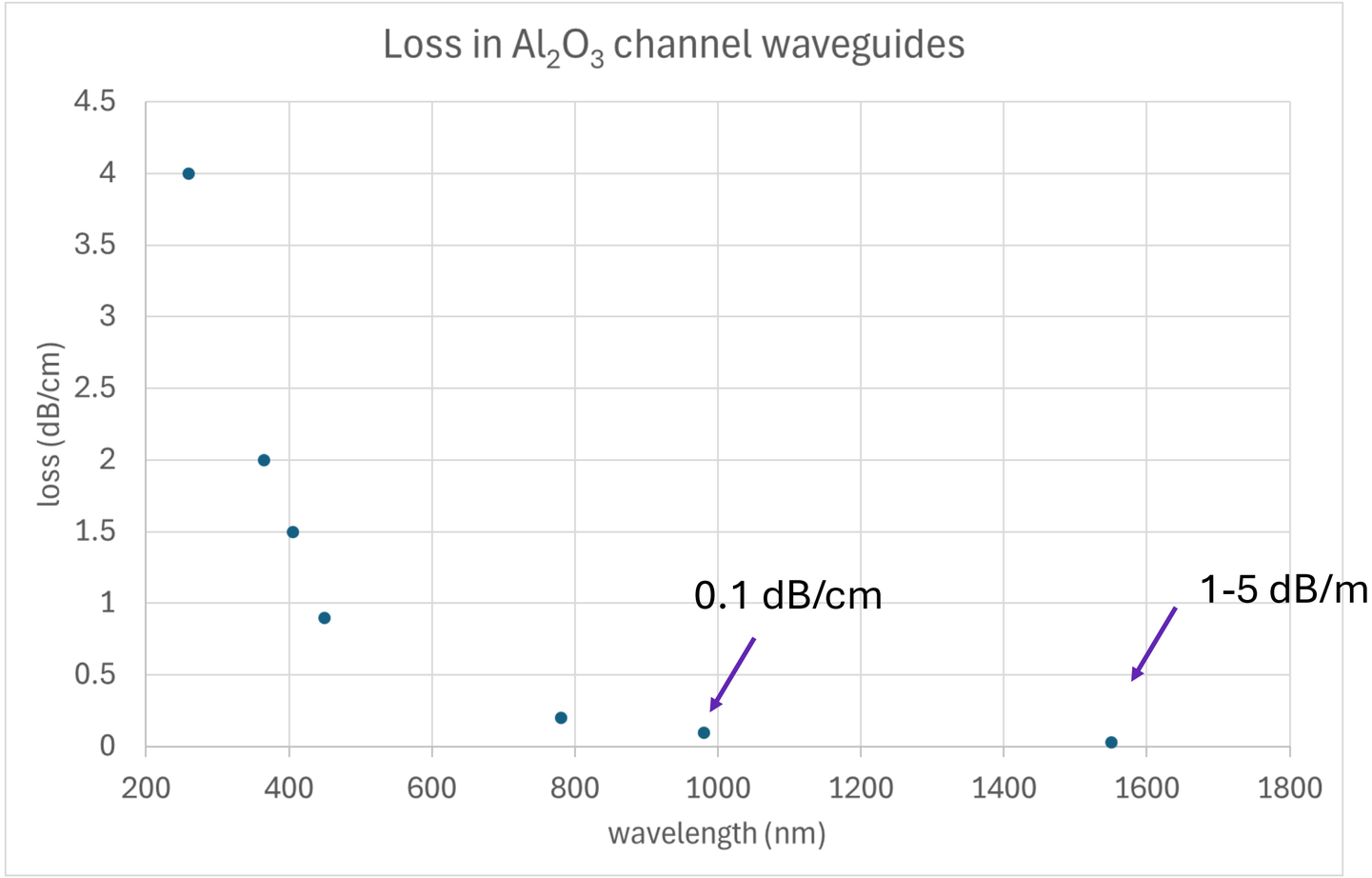
WIDE OPERATING SPECTRAL WINDOW

LOW LOSS PROPAGATION FROM THE UV TILL THE MID-INFRARED



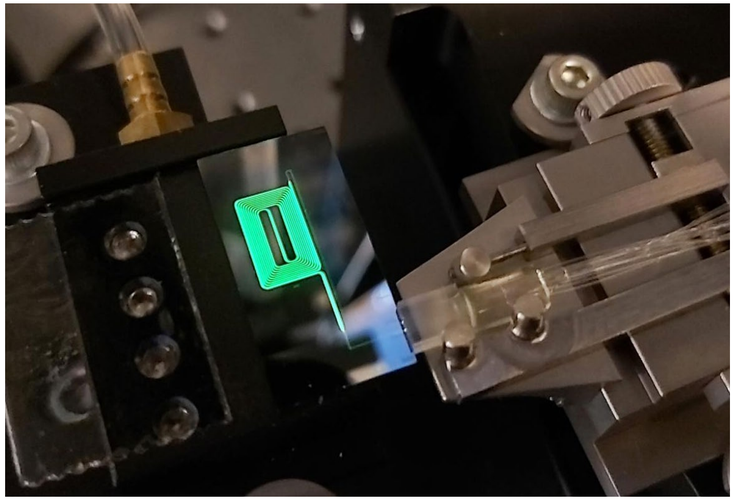
Funded by
the European Union

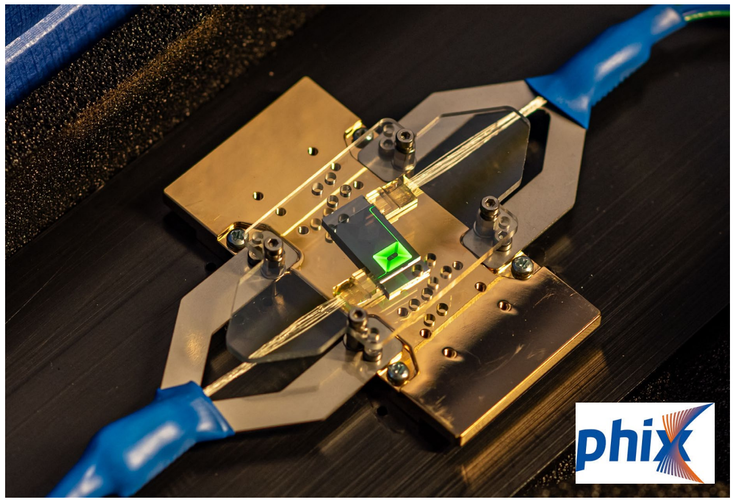
ALUVIA
PROJECT



HIGH RARE-EARTH ION SOLUBILITY

ERBIUM DOPED Al_2O_3 AMPLIFIERS

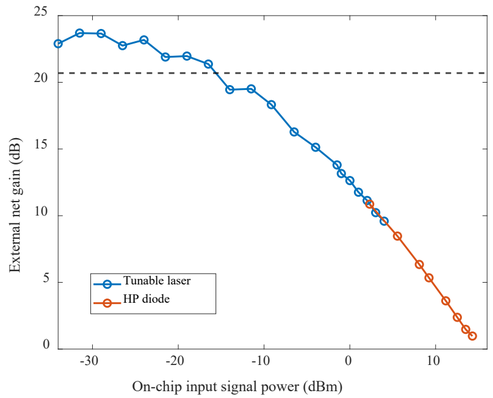




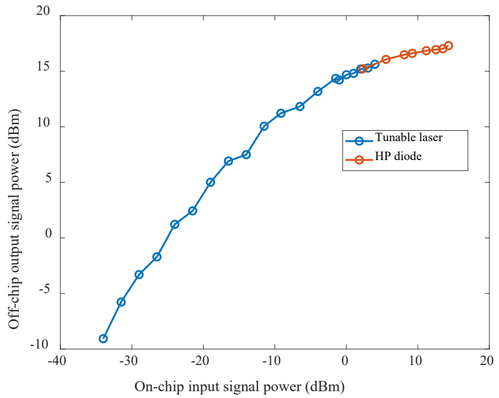
Example of performance:

- 50 cm long spiral
- $1.5x10^{20}$ ions/cm^3 erbium concentration
- Cross-section waveguide: 770 nm x 1.75 um

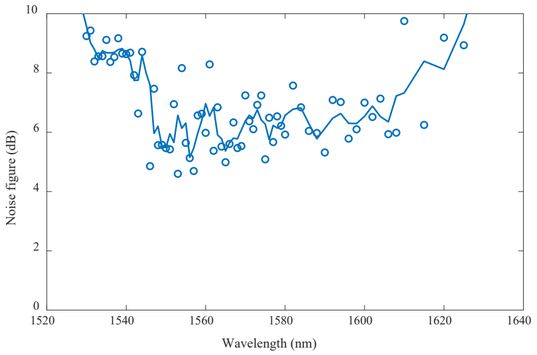
Fiber-to-fiber gain



Power on the output fiber

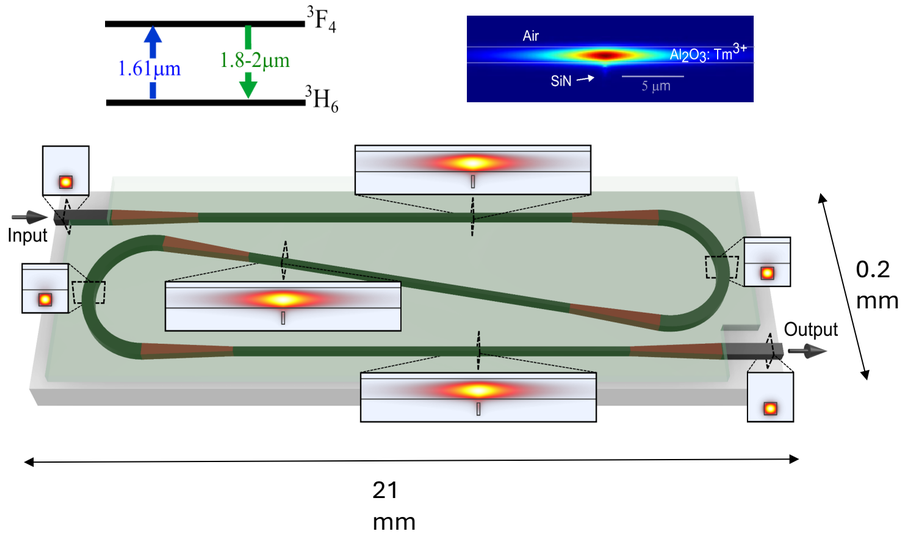


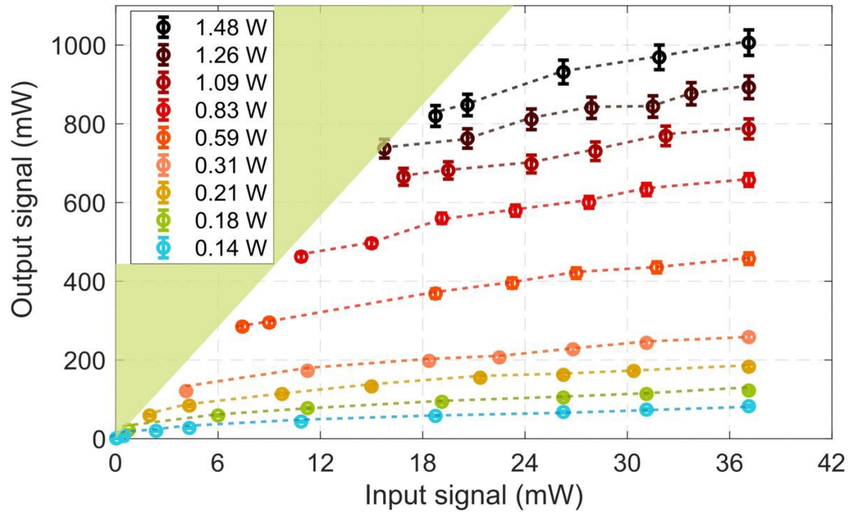
Fiber-to-fiber NF (internal noise figure ~2dB less)

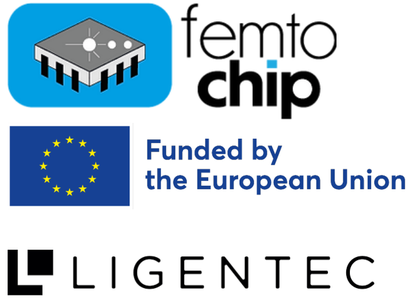


HIGH RARE-EARTH ION SOLUBILITY

THULIUM DOPED Al_2O_3 AMPLIFIERS







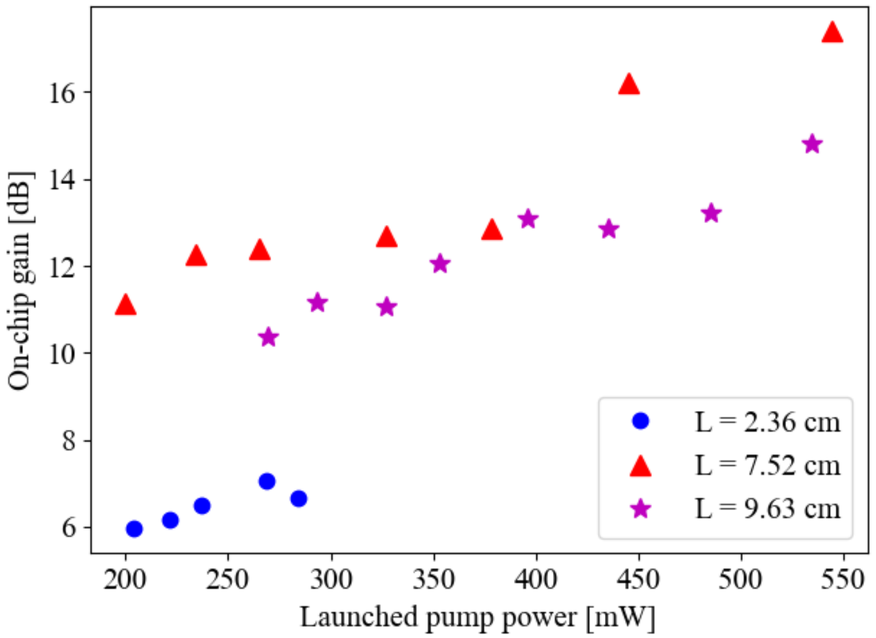
- 1 W of output power (36 mW on input signal)
- Ultrafast pulse amplification: 116 fs pulses, 800W peak power
- NF ~4 dB

[Singh, N., Lorenzen, J., Wang, K. *et al.* Watt-class silicon photonics-based optical high-power amplifier. *Nat. Photon.* **19**, 307–314 (2025)]
[Singh, N., Lorenzen, J., Kilinc, M. *et al.* Sub-2W tunable laser based on silicon photonics power amplifier. *Light Sci Appl* **14**, 18 (2025)]
[Gaafar, M.A., Ludwig, M., Wang, K. *et al.* Femtosecond pulse amplification on a chip. *Nat Commun* **15**, 8109 (2024)]

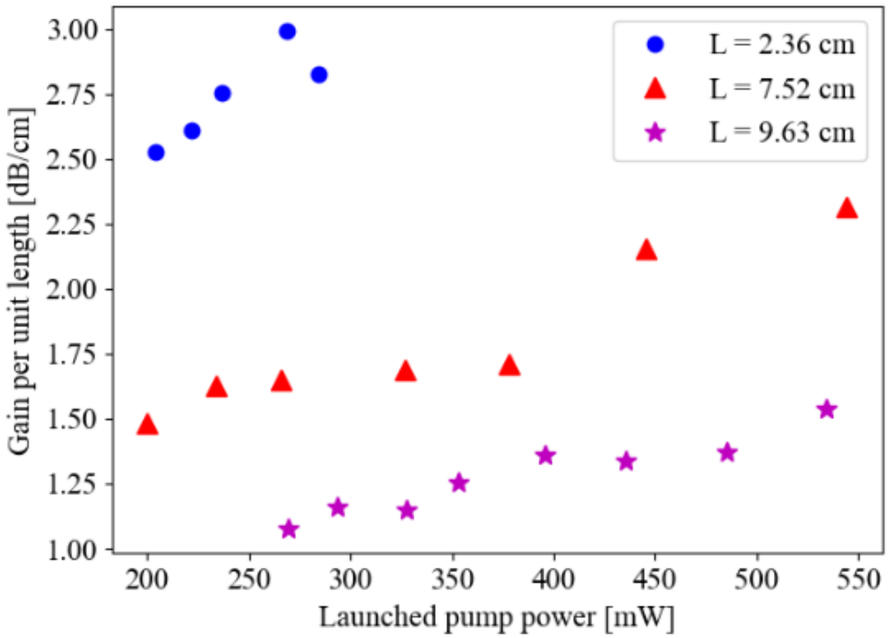
HIGH RARE-EARTH ION SOLUBILITY

NEODYMIUM DOPED Al_2O_3 AMPLIFIERS (~1064 nm gain)

~ 17 dB gain



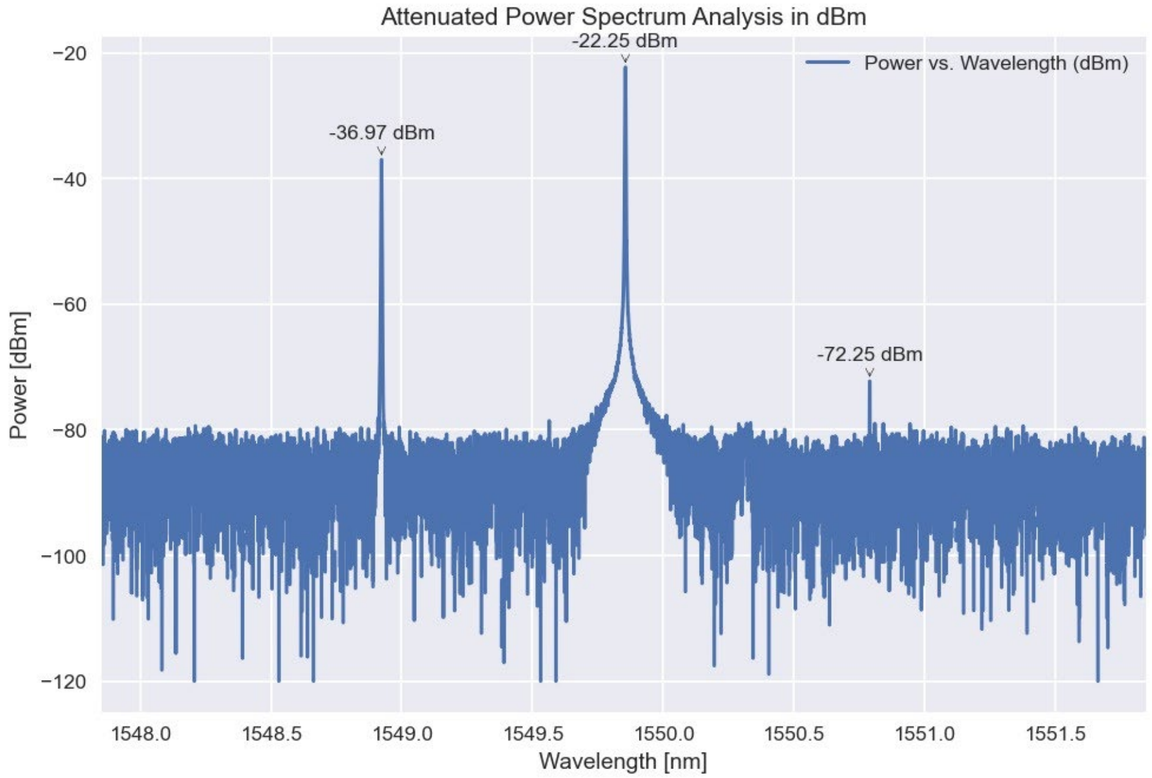
Losses ~ 0.64 dB/cm



[B. Jongebloed, et. al., “Sputter-deposited neodymium-doped aluminium oxide for waveguide amplifiers in the O-band,” SPIE Photonics West (2025)]

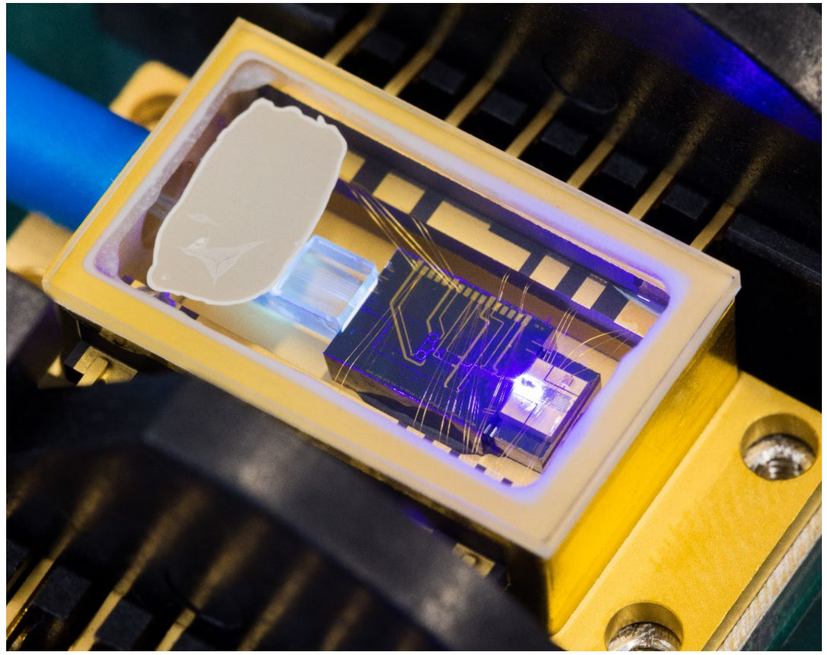
HIGH LINEARITY AND POWER HANDLING

- Four wave mixing observed
- ~50 W in ring CW
- n_2 comparable to SiO_2
- Very linear material with high power handling

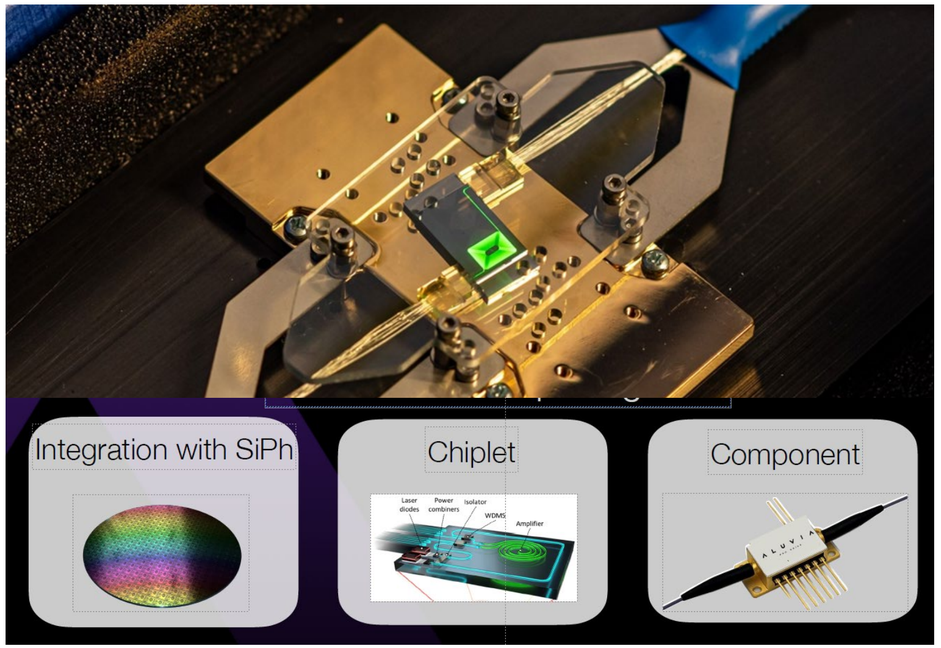


Demonstrators with ALUVIA's technology

Tunable laser at 405 nm

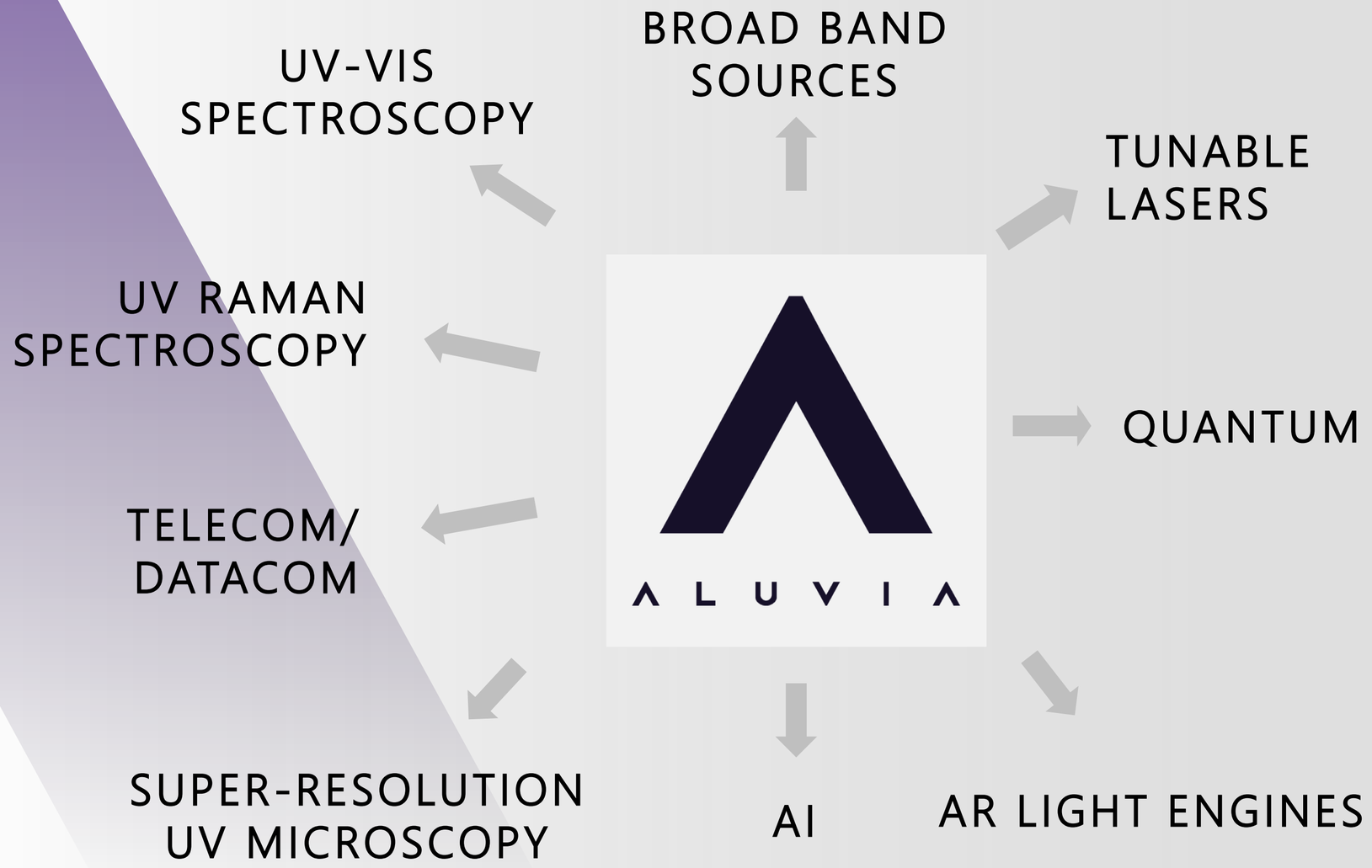


PIC-EDWA



Markets

Aluvia's technology is poised to disrupt many existing and emerging markets



MPW schedule: Passives

MPW run 6

- Registration deadline: 2025-03-31
- Mask submission deadline: 2025-04-30

MPW run 7

- Registration deadline: 2025-06-30
- Mask submission deadline: 2025-07-31

MPW run 8

- Registration deadline: 2025-09-30
- Mask submission deadline: 2025-10-31

ALUVIA
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Get In Touch

Let’s shape the future of photonics together!

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