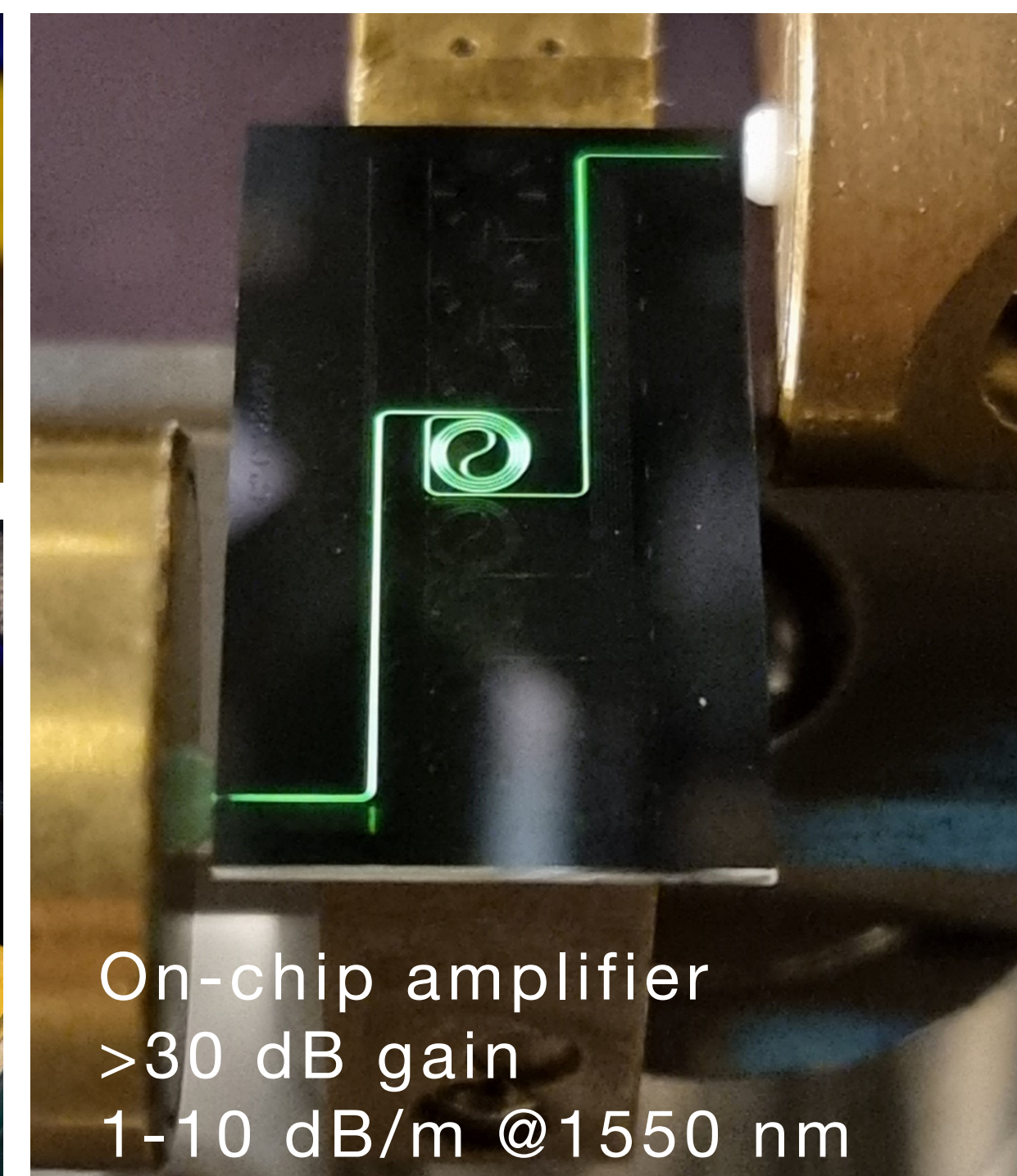
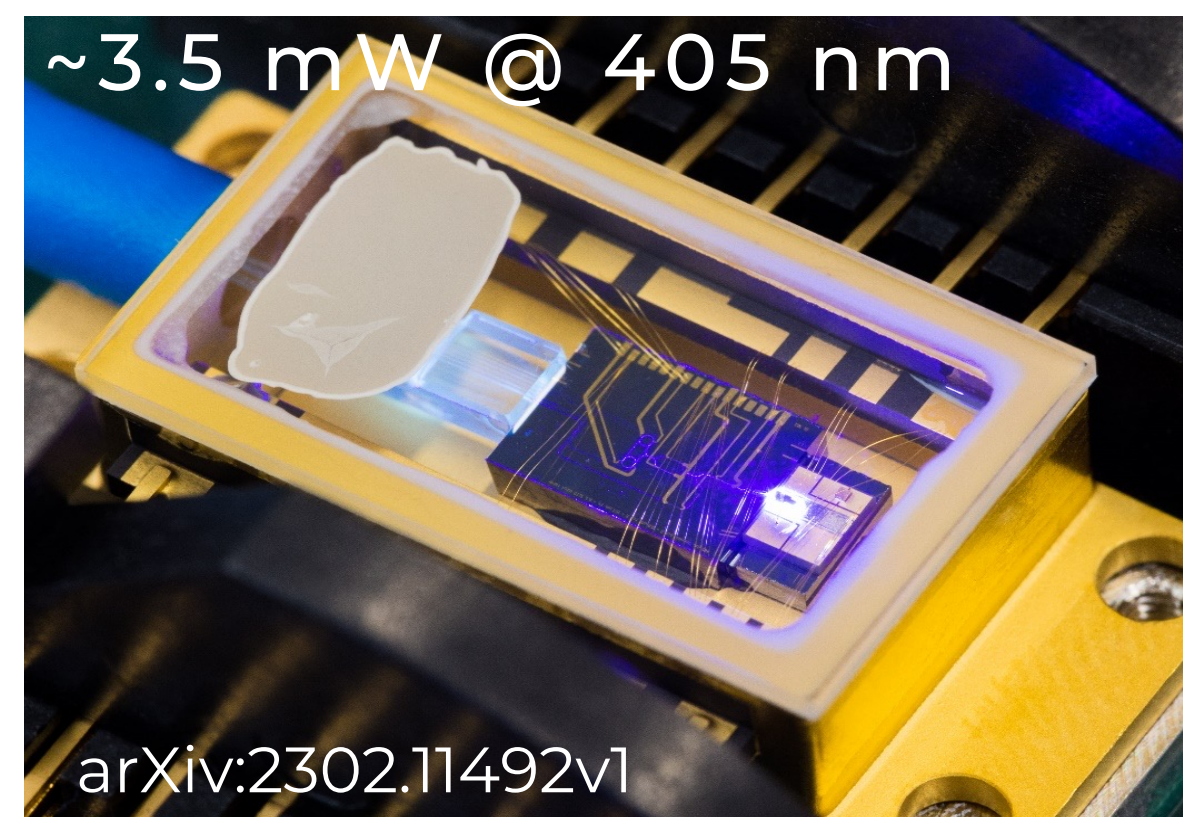
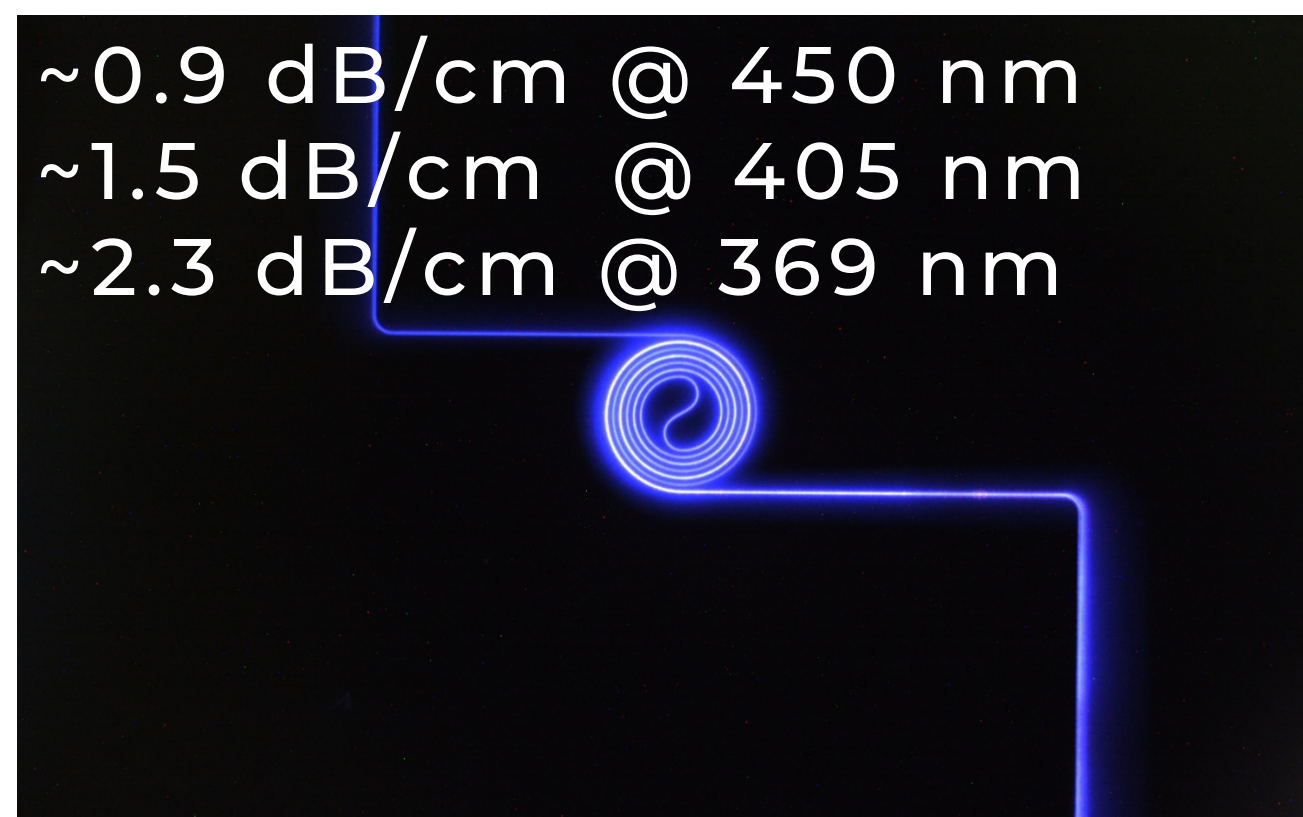


ALUVIA

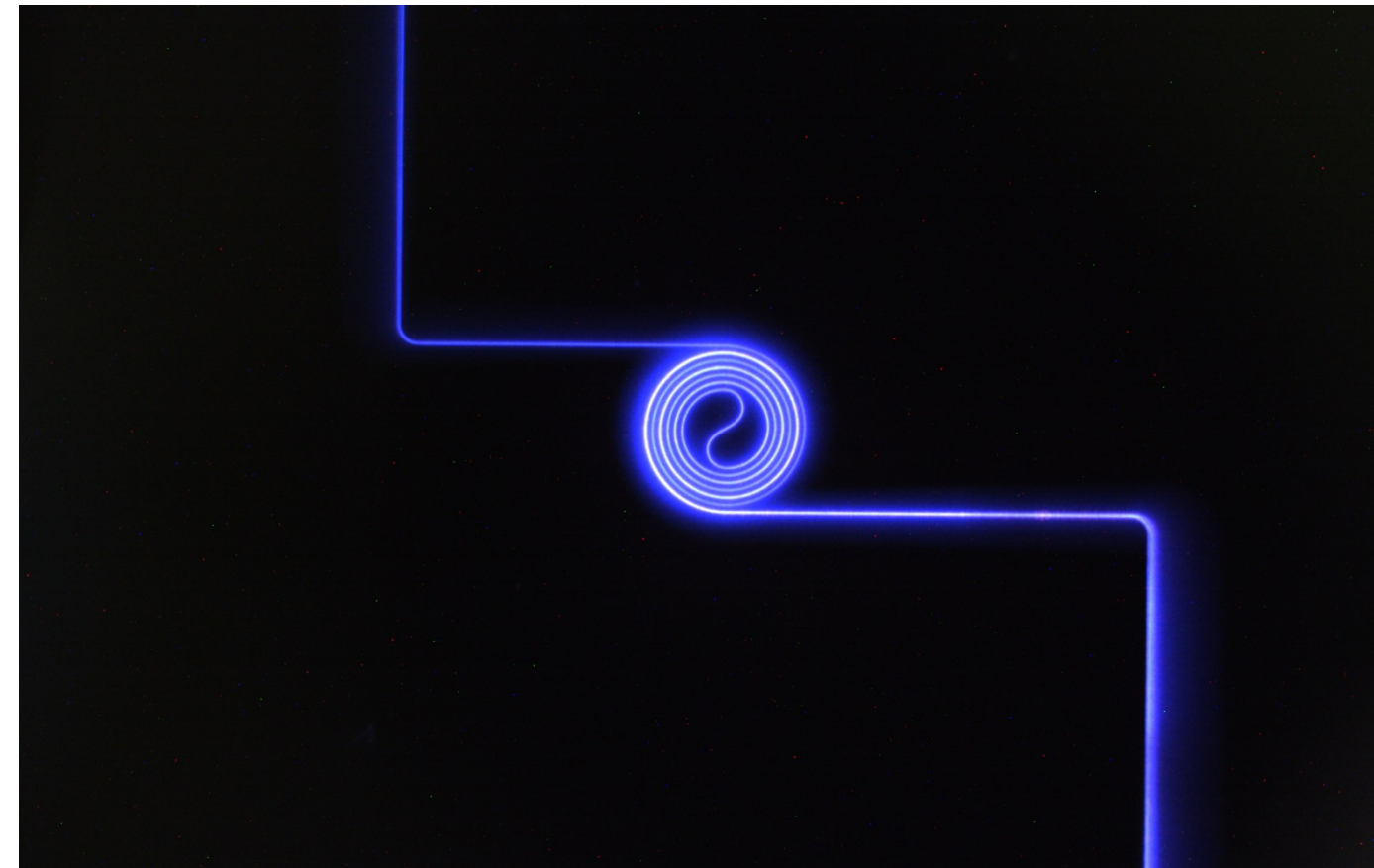
P H O T O N I C S

ALUVIA PHOTONICS

ALUVIA PHOTONICS OFFERS PHOTONIC INTEGRATED CIRCUITS (PICS) IN THE Al_2O_3 (ALUMINIUM OXIDE) INTEGRATED PHOTONIC PLATFORM TO (1) ENABLE BROADBAND OPERATION FROM UV TILL MID-IR AND (2) OPTICAL AMPLIFICATION BY RARE-EARTH ION DOPING



AL₂O₃ CHANNEL WAVEGUIDE LOSSES

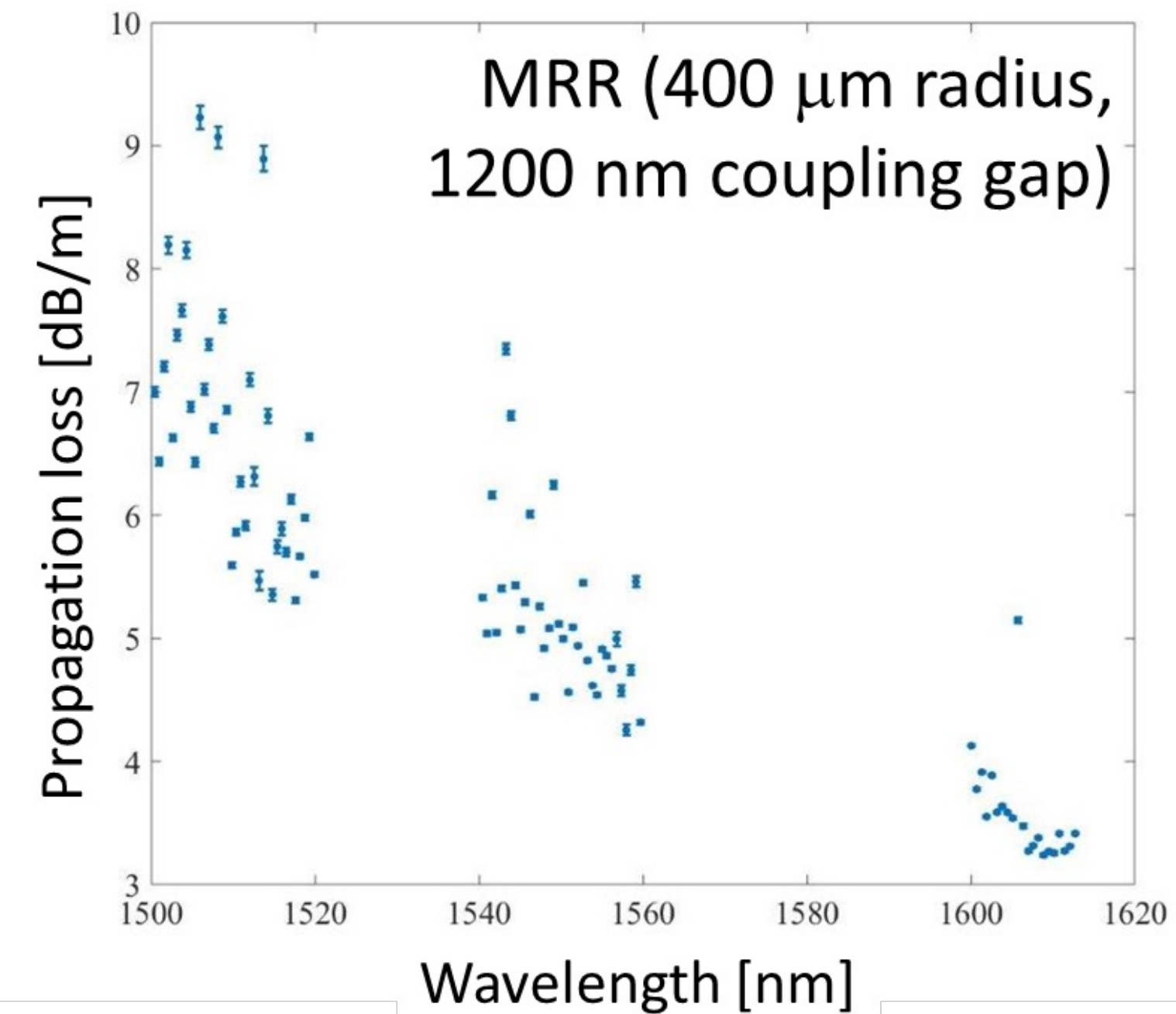
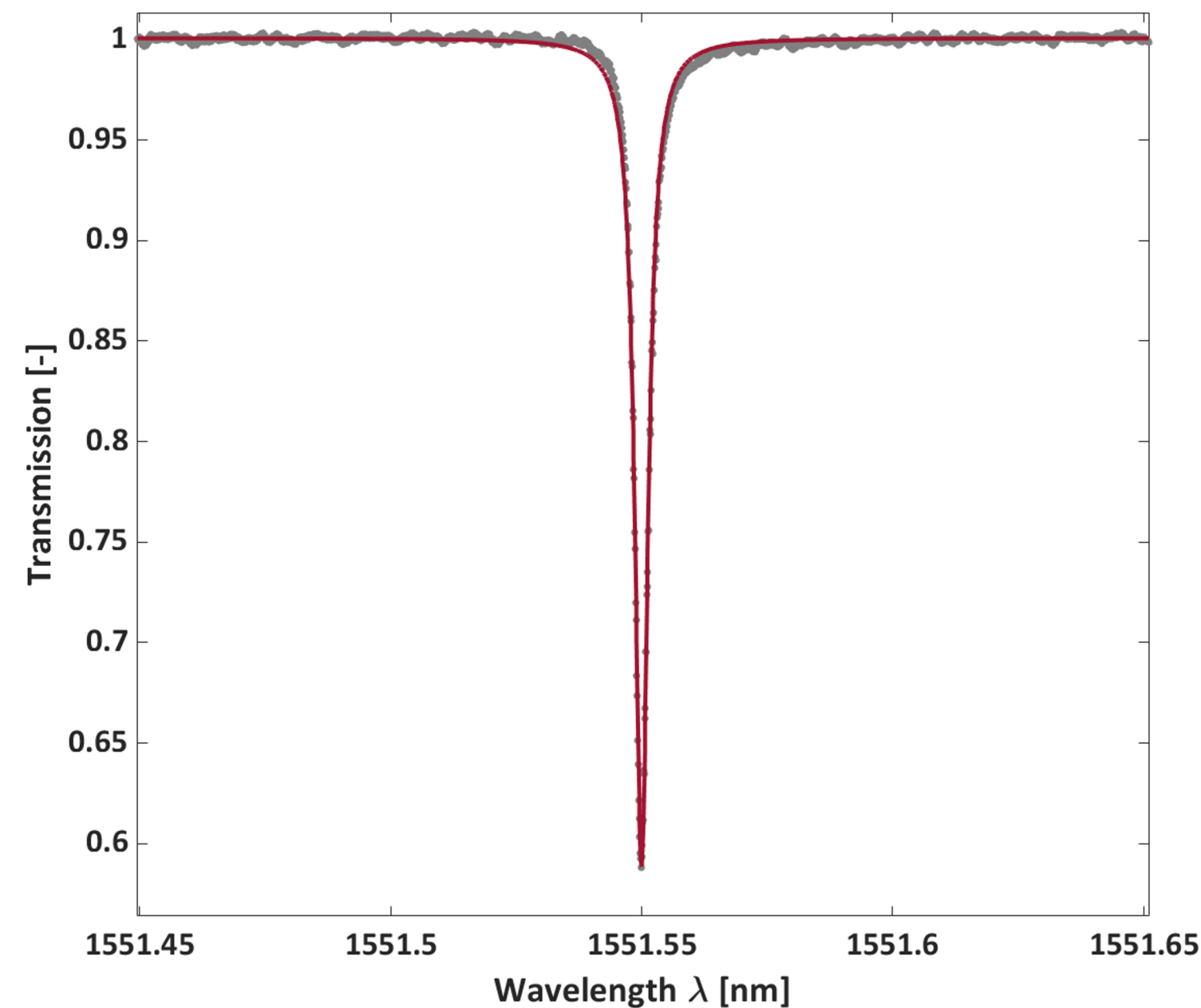


Channel waveguide losses mid-confinement waveguides:

- | | | |
|-----------|---------------|---------------|
| • @780 nm | TE: 0.2 dB/cm | |
| • @450 nm | TE: 0.9 dB/cm | TM: 1 dB/cm |
| • @405nm | TE: 1.5 dB/cm | TM: 1.1 dB/cm |
| • @369 nm | TE: 2.3 dB/cm | TM: 1.3 dB/cm |

[Manuscript in preparation]

AL₂O₃ WAVEGUIDE LOSSES IN C-BAND

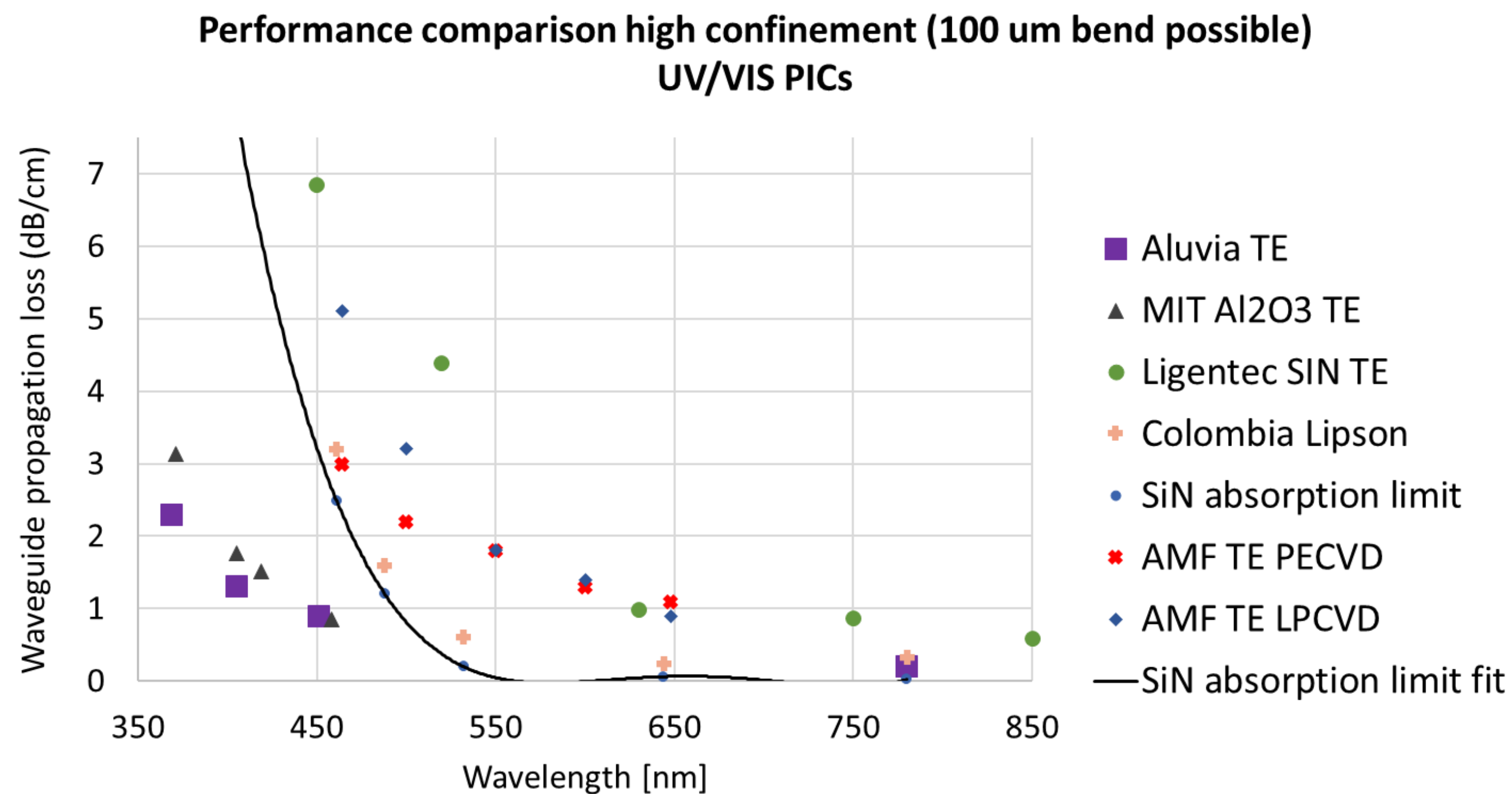


Propagation loss: @1550nm: ~5 dB/m, $Q_{\text{int}} \sim 6 \times 10^6$
@1610nm: ~3 dB/m, $Q_{\text{int}} \sim 8.5 \times 10^6$

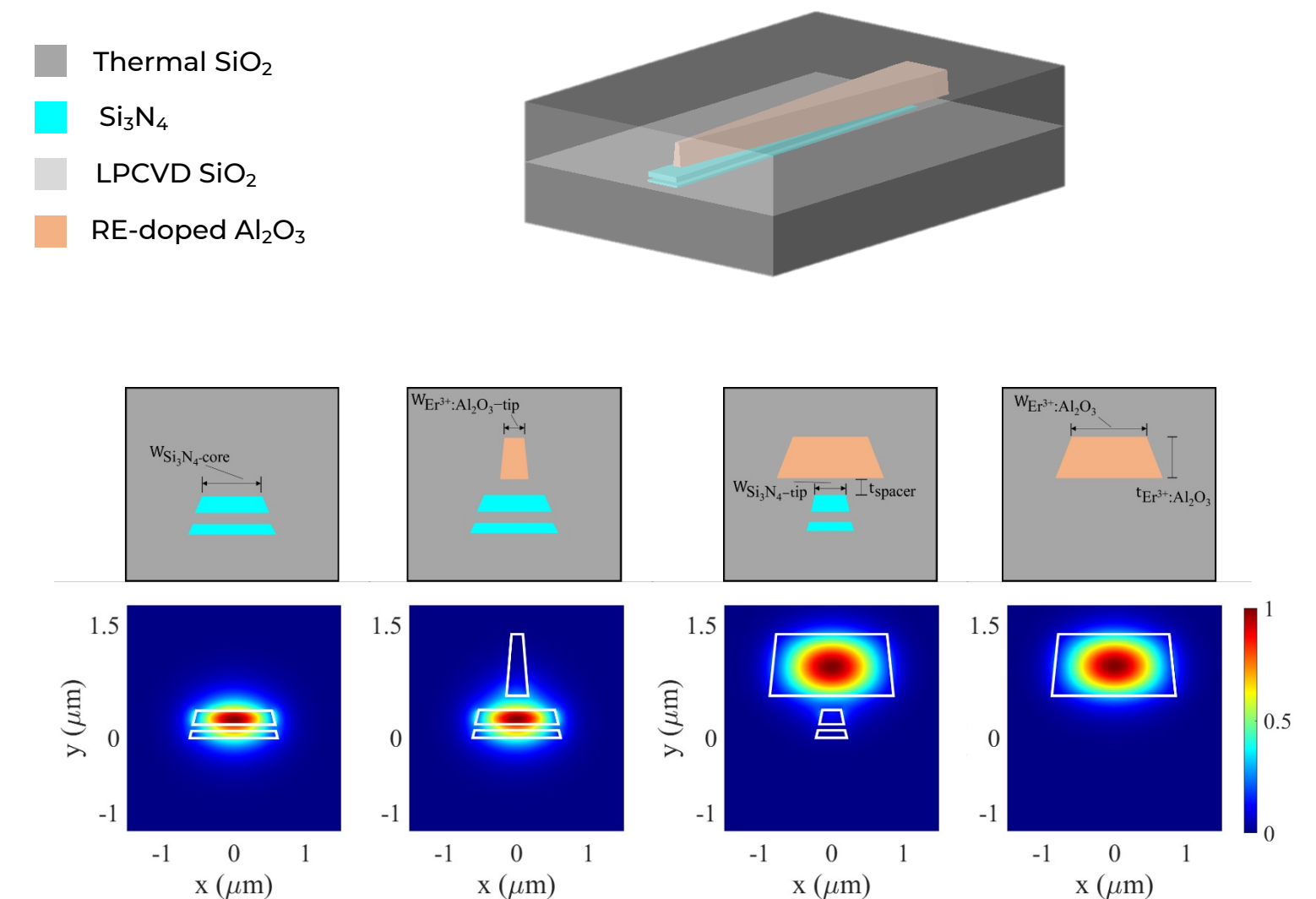
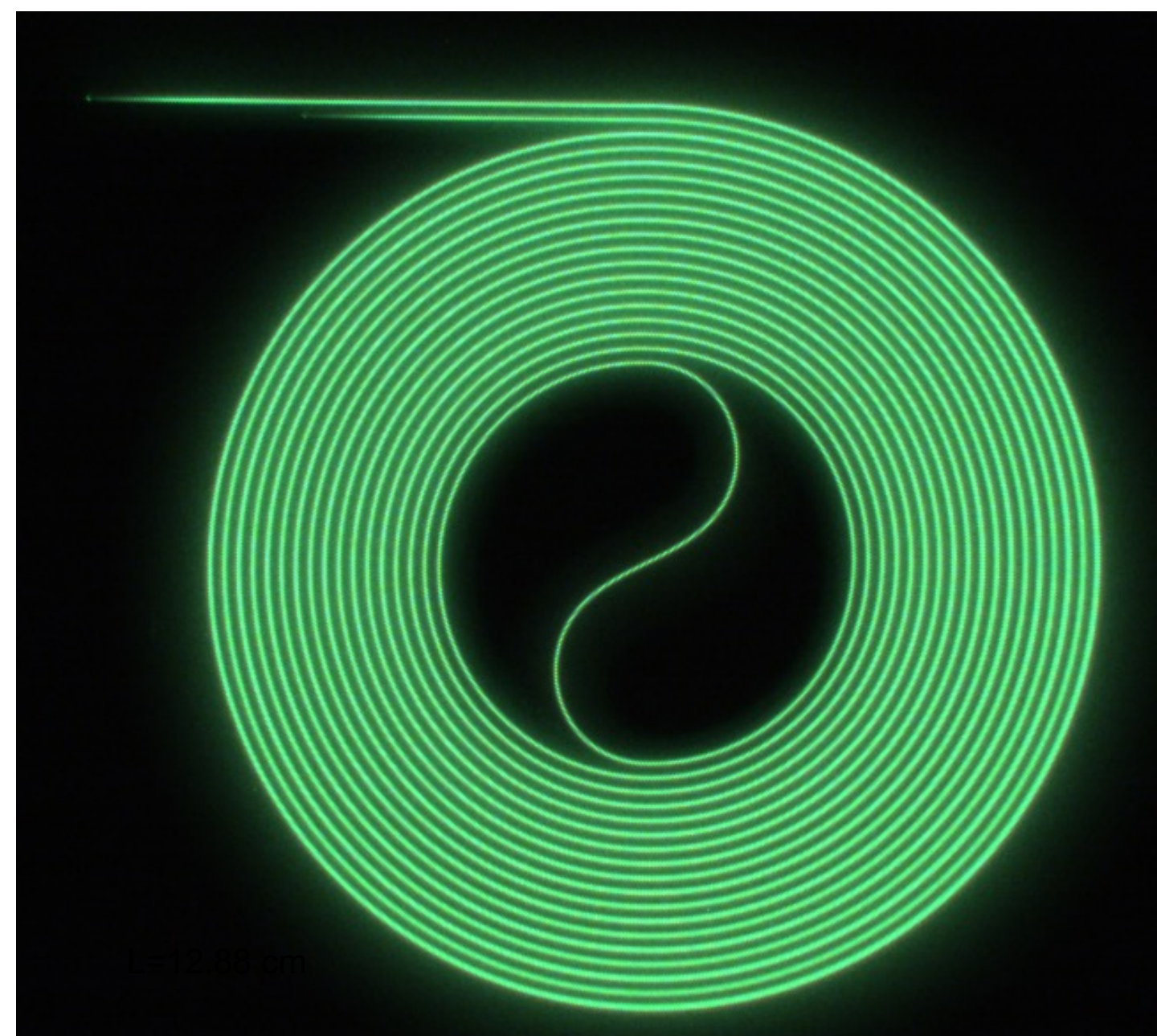
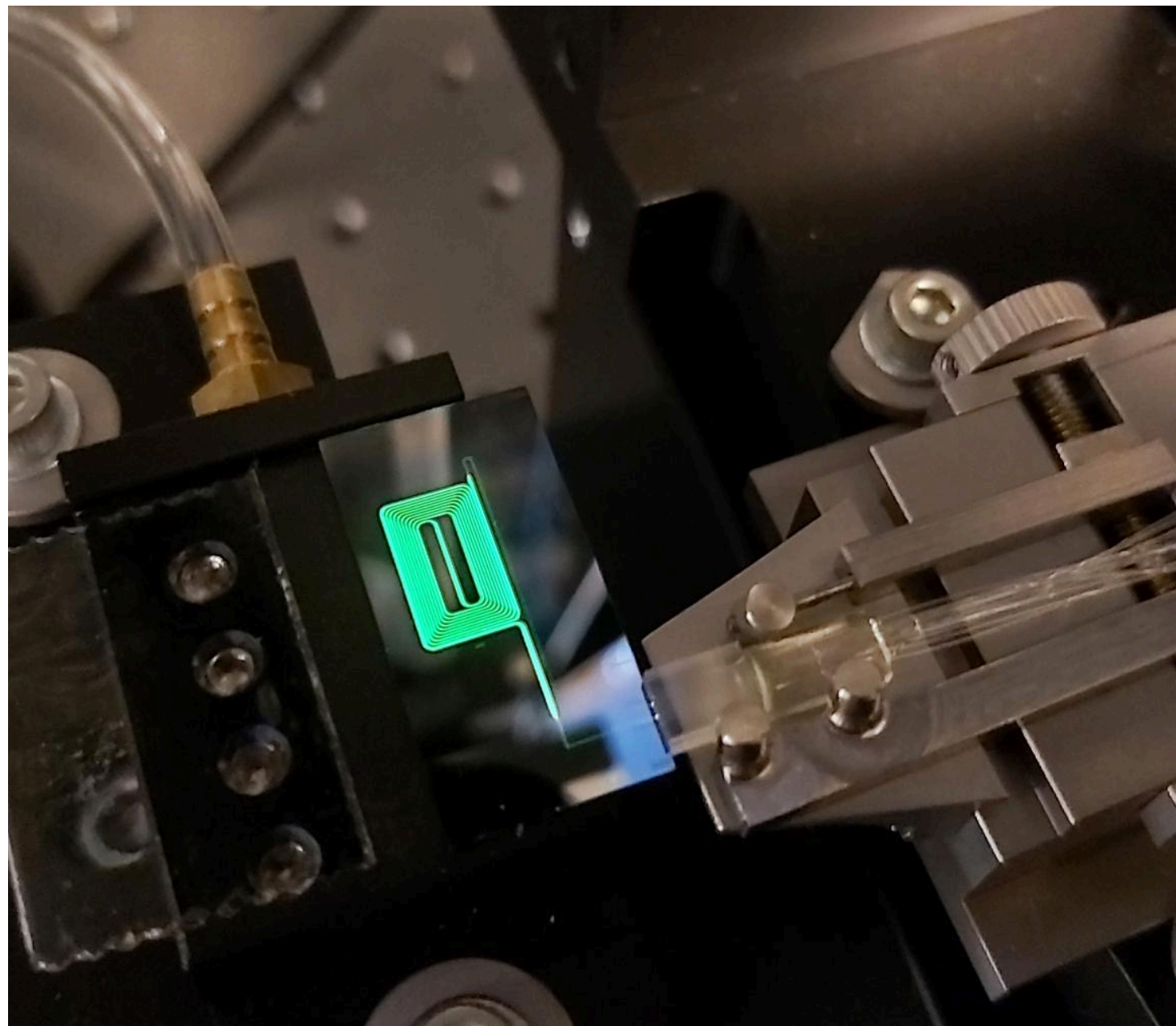
ALUVIA

PERFORMANCE COMPARISON

STATE OF THE ART



$\text{Er}^{3+} : \text{Al}_2\text{O}_3$ WAVEGUIDE AMPLIFIERS

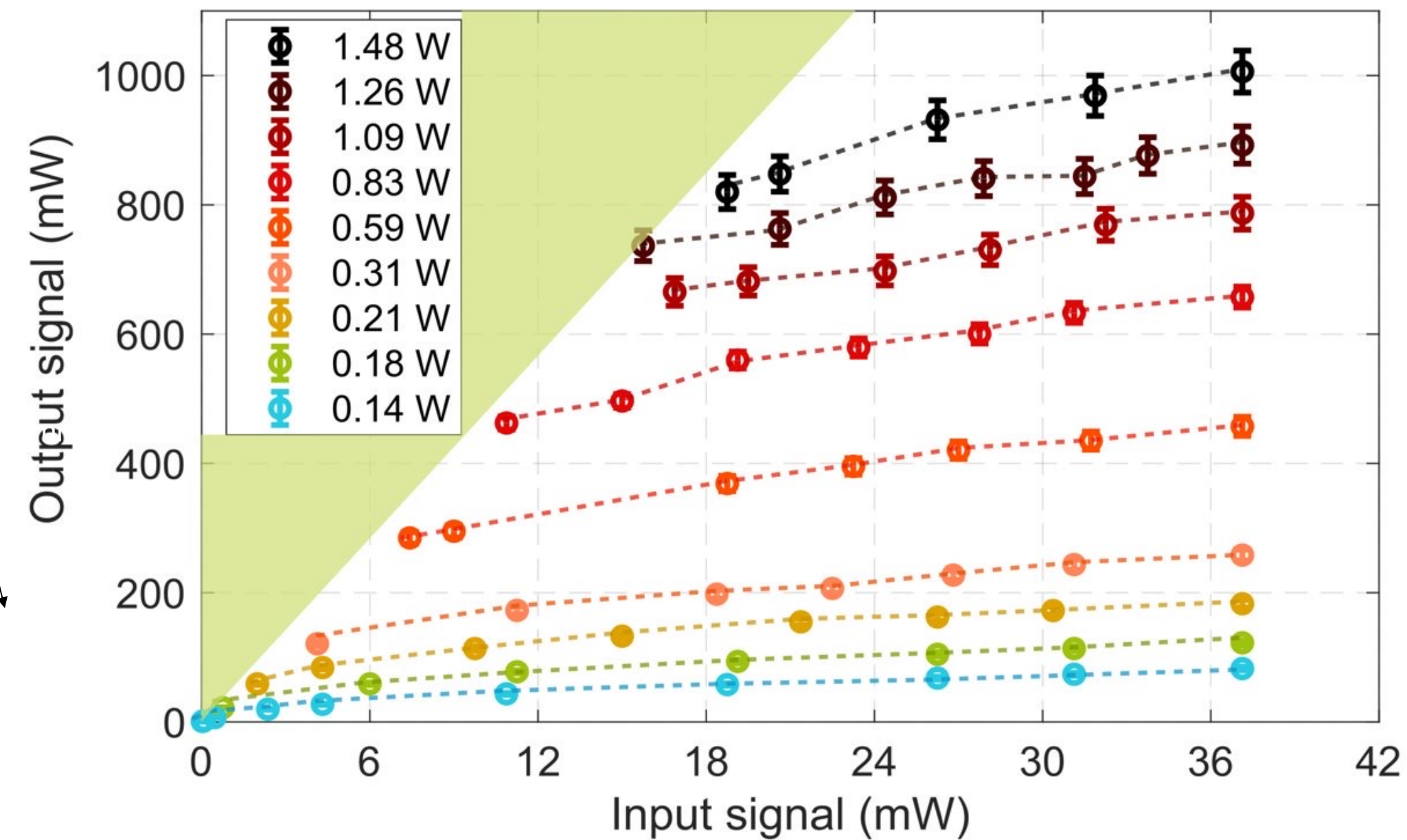
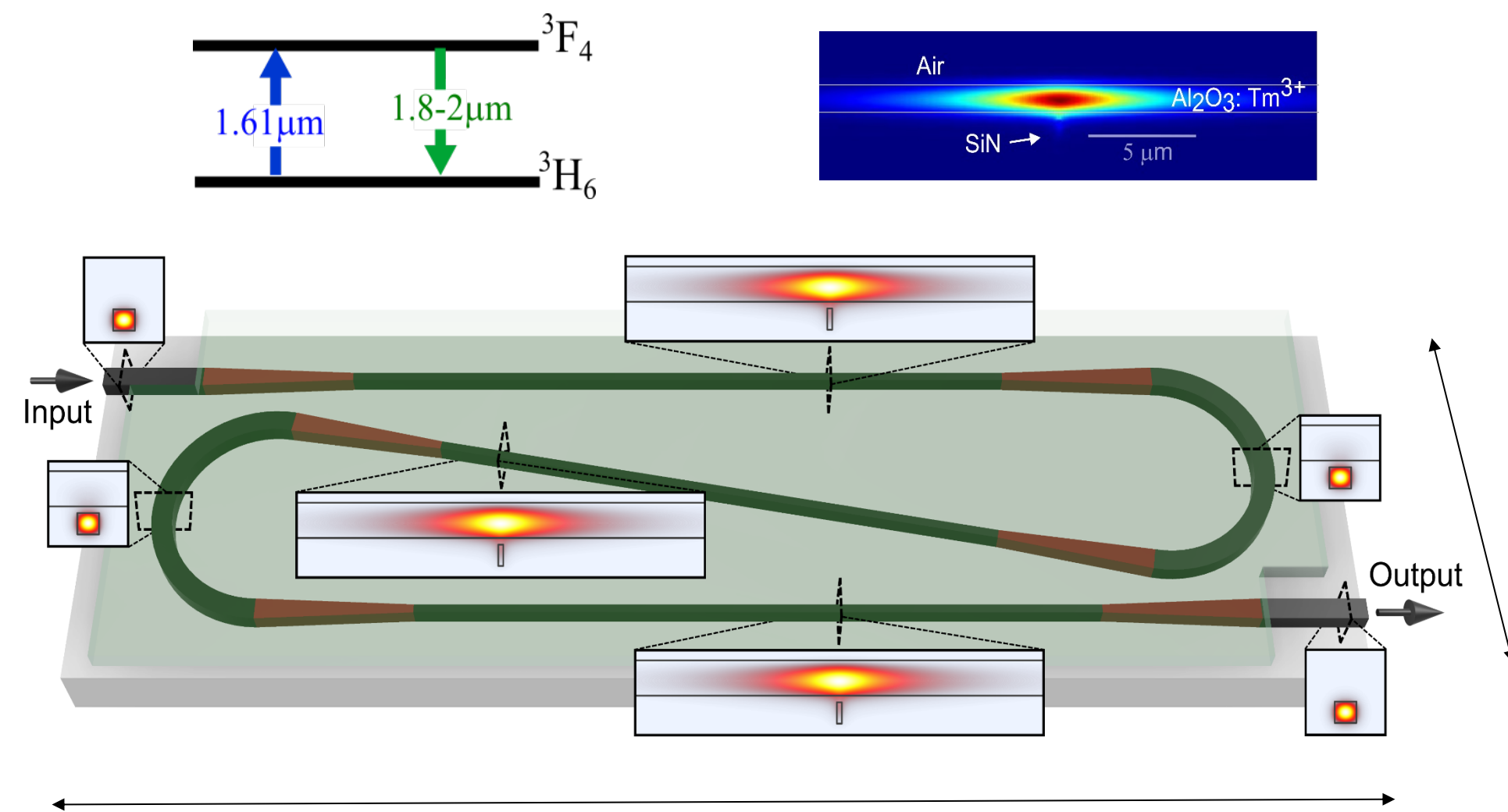


Highlights: >30 dB of small signal net internal gain
>10 dB of fiber-to-fiber net gain
~30 mW of output power



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HIGH POWER TM^{3+} : Al_2O_3 AMPLIFIER

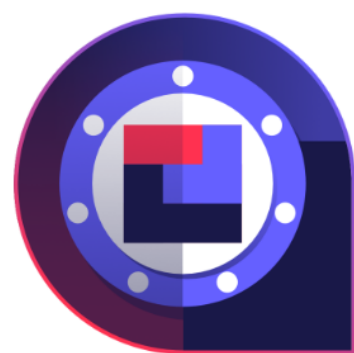


- Highlights:
- 1 W of output power (36 mW on input signal)
 - Ultrafast pulse amplification: 116 fs pulses, 800W peak power

[N. Singh et. al., "Chip-scale, CMOS-compatible, high energy passively Q-switched laser," submitted 2023]

ALUVIA PHOTONICS PDK

ALUVIA PHOTONICS OFFERS AN OPEN ACCESS PDK THROUGH LUCEDA IPKISS. CONSISTING OF PARAMETERIZED BUILDING BLOCKS.



Included in your IPKISS license

Luceda PDKs

Luceda offers access to a wide range of foundry PDKs. Design manufacturable PICs and tape-out with your foundry of choice.

REQUEST PDK ACCESS

Select a material platform to discover the available Luceda PDKs

Silicon (Production)Silicon (Prototyping)Silicon NitrideIndium PhosphideLithium NiobateAluminium OxideAssembly

Expand the PDKs below to discover their functionality and visualize detailed information.

Aluvia



ALUVIA

Location

Netherlands

Current version

1.0

Release month

September 2023

Technology used

Al₂O₃

Heater

Metal

Available components

Y-branch

Ring Resonator

MMI

Spiral

Directional Coupler

Edge Coupler

Heater

Luceda PDK functionality

Supported Luceda products: IPKISS and Link for Siemens EDA

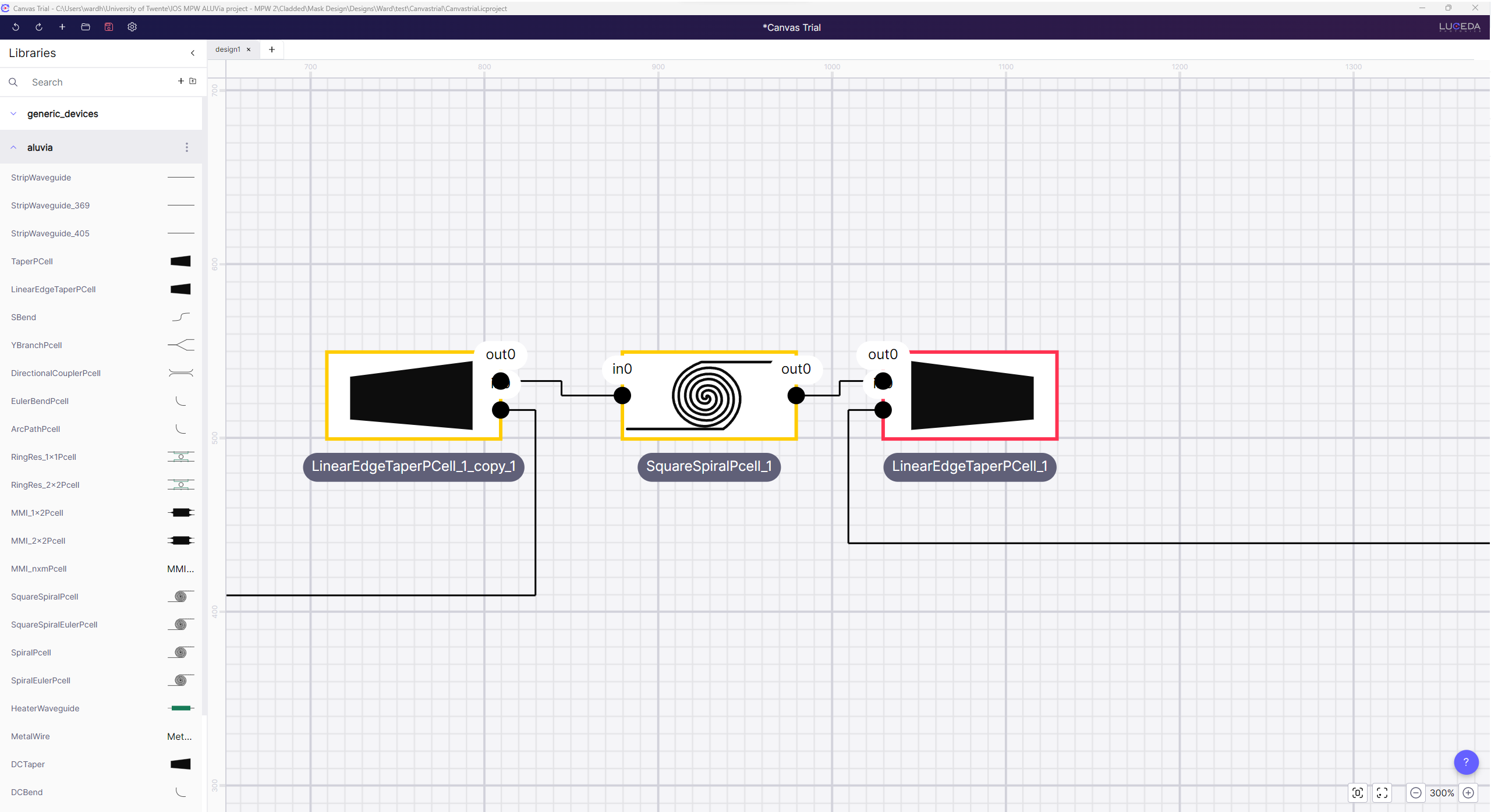
Predefined components: parametric layout

Virtual fabrication

Examples and documentation

Foundry details

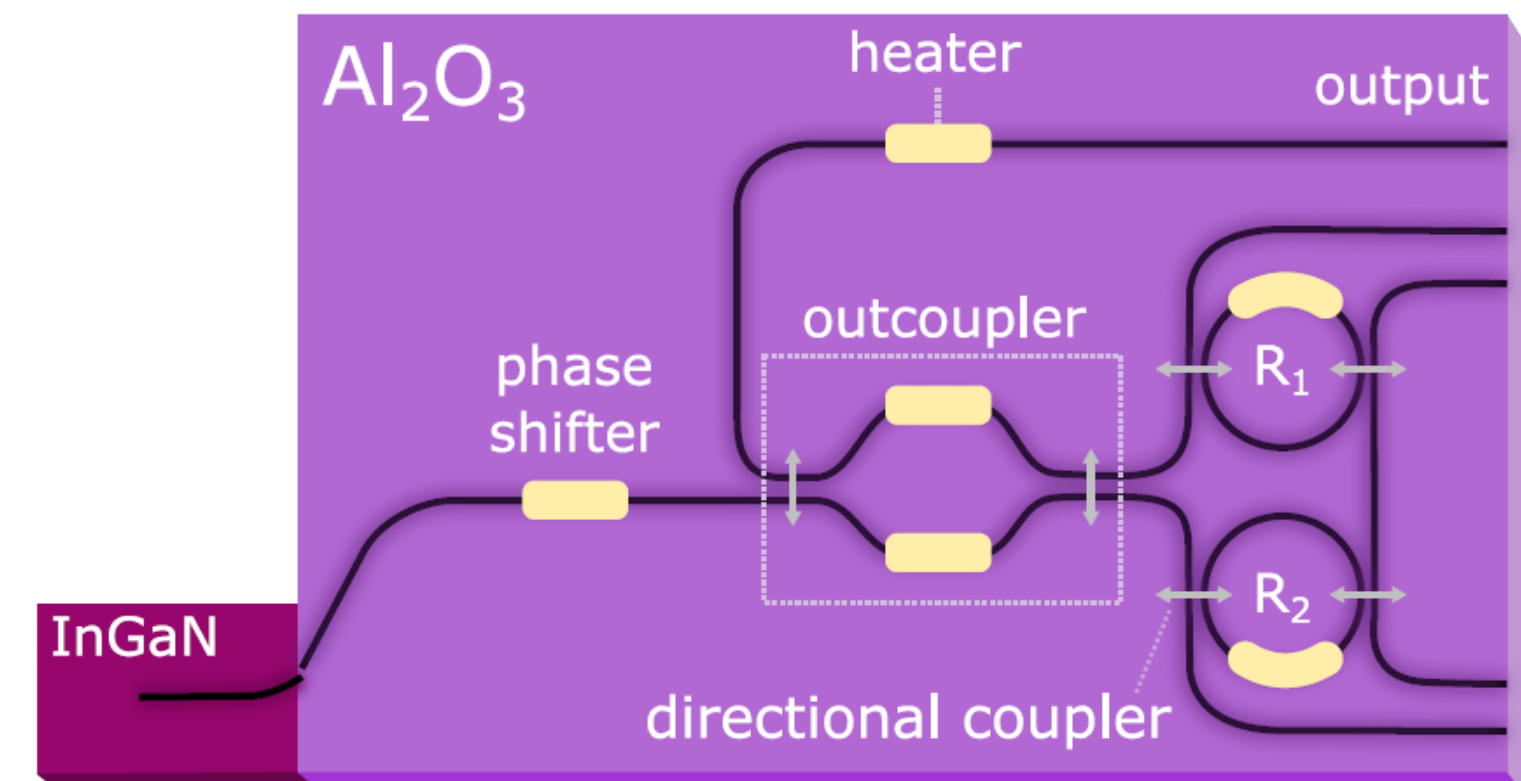
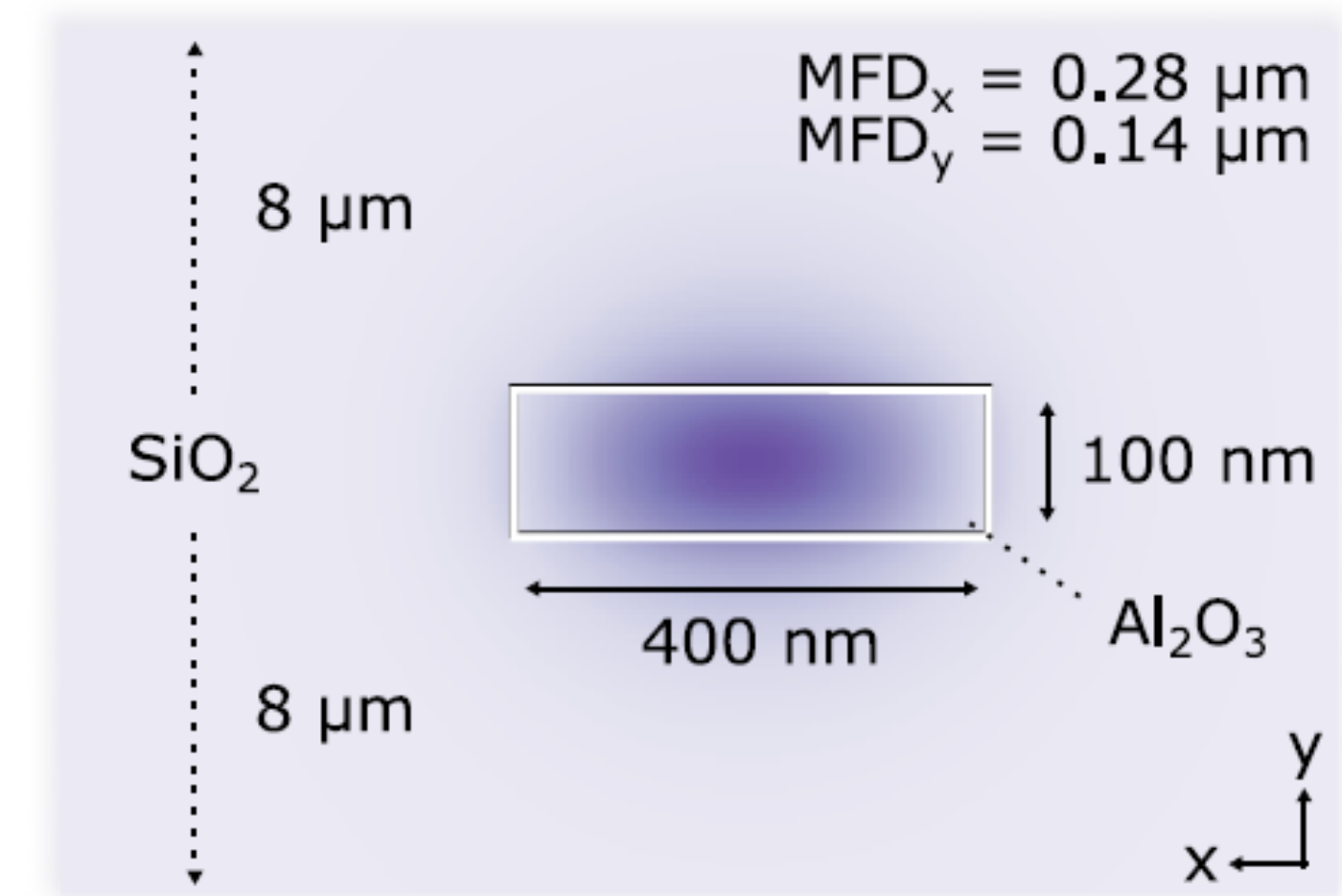
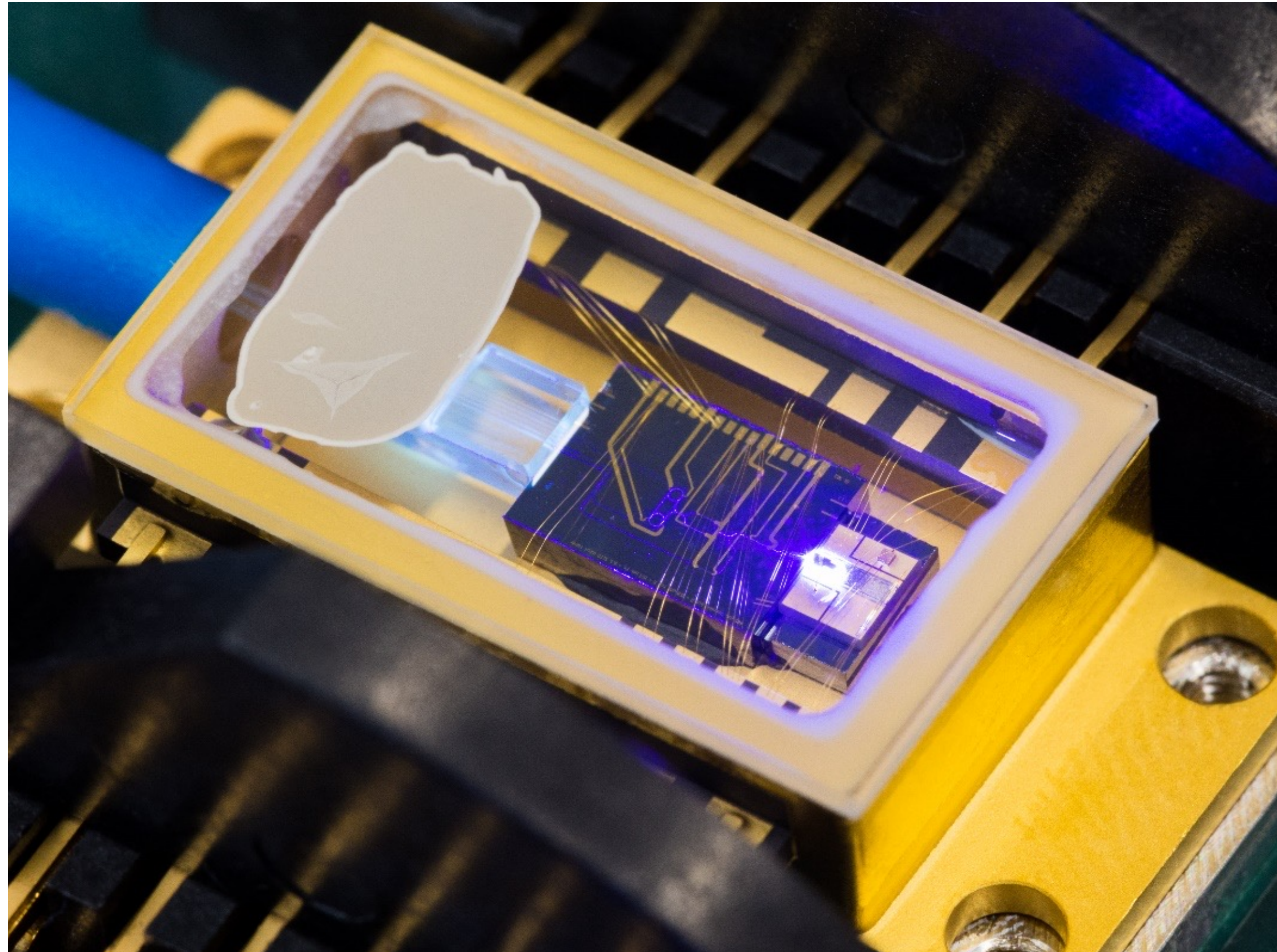
<https://aluviaphotonics.com/>



ALUVIA

PIC DEVICES AND BUILDING BLOCKS

Al_2O_3 NEAR-UV TUNABLE LASER

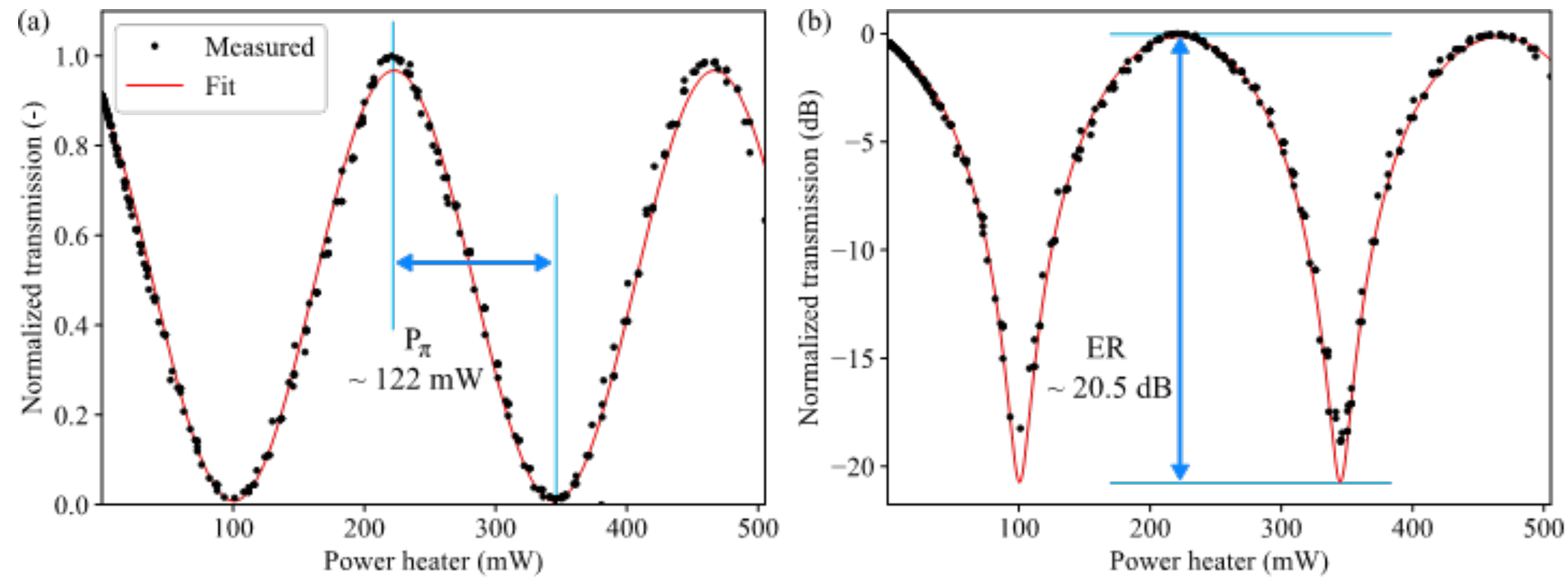


arXiv:2302.11492v1

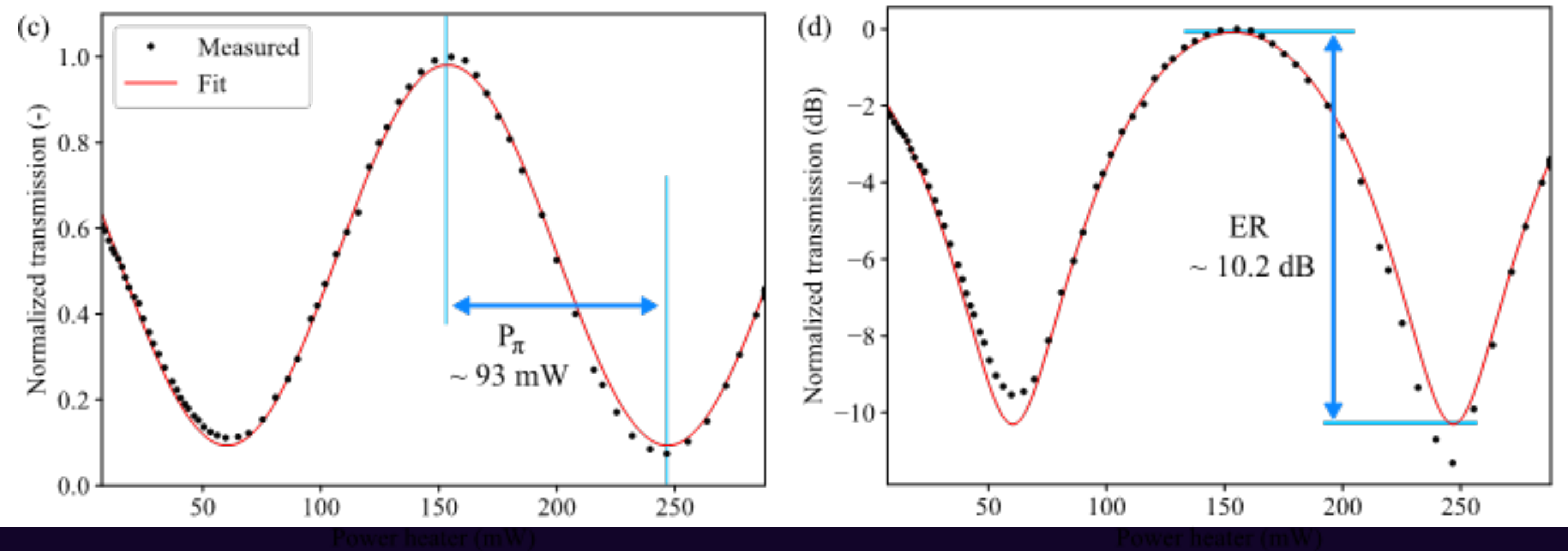
PIC DEVICES AND BUILDING BLOCKS

MODULATORS

$\lambda = 450 \text{ nm}$



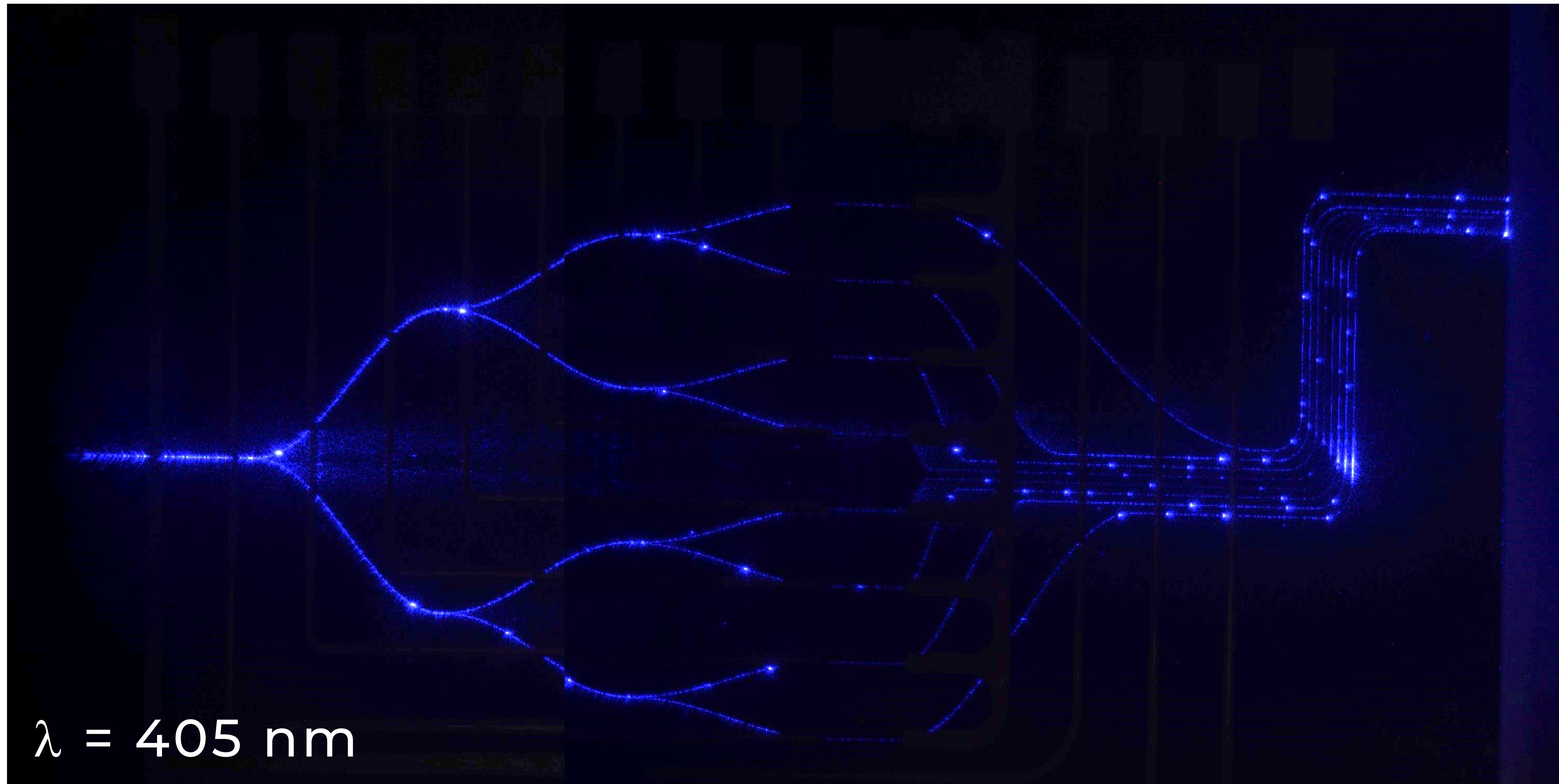
$\lambda = 369 \text{ nm}$



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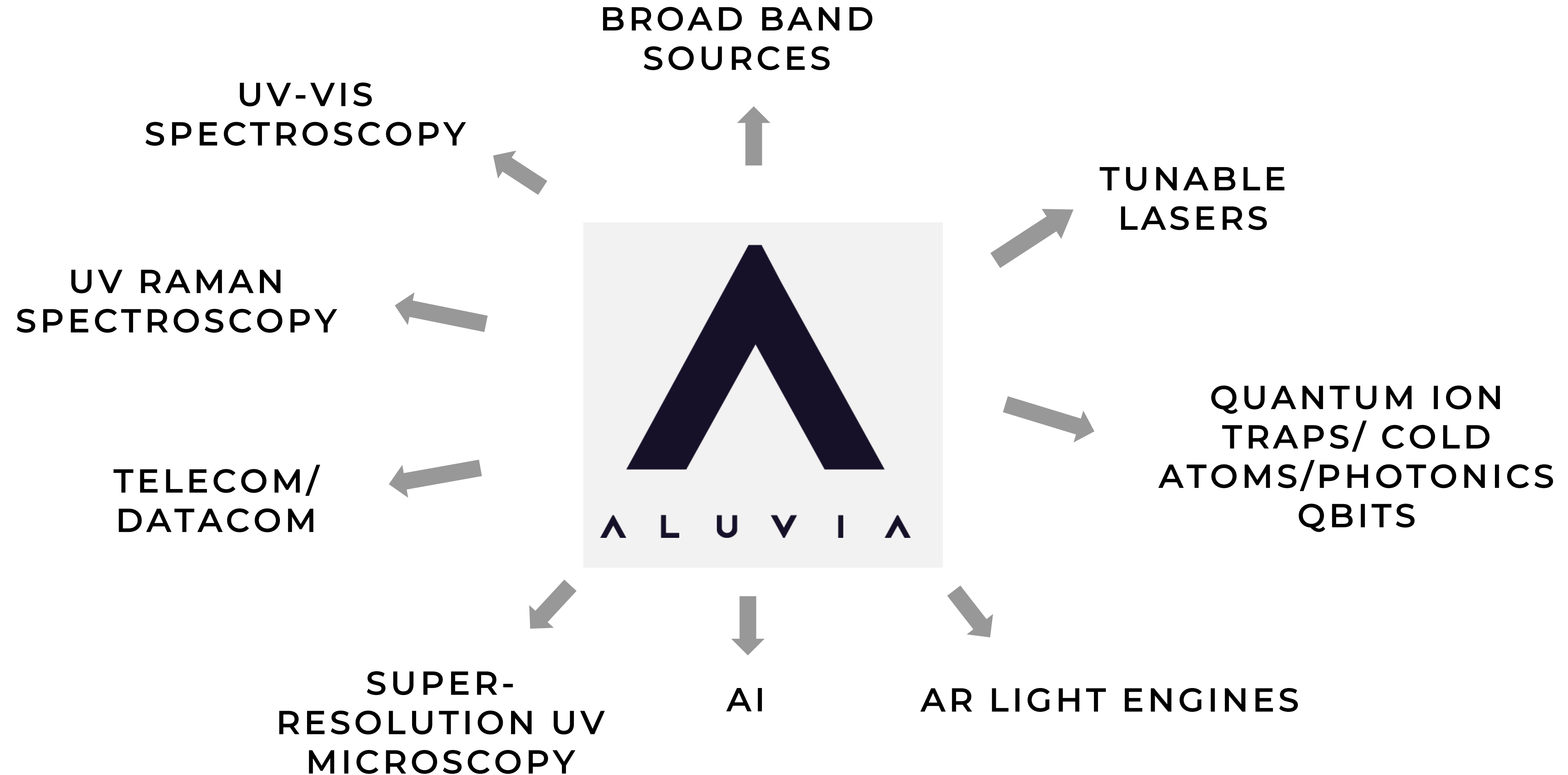
PIC DEVICES AND BUILDING BLOCKS

SPLITTERS



ALUVIA

APPLICATION MARKETS



ALUVIA

CONCLUSIONS

- The Al_2O_3 platform provides low-loss broadband operation from the UV (~200 nm) till the mid-IR (5.5 μm)
- By doping it, gain can be obtained across the operation bandwidth

NEXT MULTI PROJECT WAFER RUNS

- May 2024 (thin and thick)
- September 2024 (quantum and thick)
- December 2024 (quantum and thick)

Stay tuned for the announcement
of the final dates!

ALUVIA

The background of the slide is a dark, blue-tinted photograph of a laboratory setting. A bright, horizontal blue laser beam cuts across the middle of the frame. In the foreground, there are various pieces of scientific equipment, including what appears to be a microscope or a similar optical instrument, and some cables. The overall atmosphere is high-tech and scientific.

ENABLING THE FIRST COMMERCIAL Al_2O_3 PICS

ALUVIAPHOTONICS.COM

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