

# FEMTUM

Mid-IR industrial fiber lasers

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# What we do?

We build the next generation of mid-IR lasers for science & industry

We assist our clients in their most demanding photonic applications

World's first short pulse (fs-ns) mid-IR fiber laser



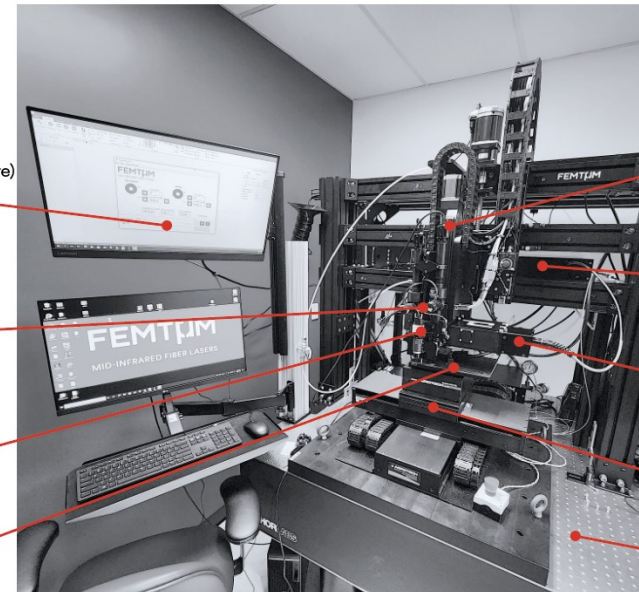
In-house laser micro-processing station

- Femtum control interface :
- Laser & fast shutter
  - Vision and laser head positioning
  - Scanner & positioning stages (DMC software)

- Galvo scanner :
- Mid-IR Ftheta & objective lens
  - Input aperture diameter up to 20 mm

- Vision system:
- 20X & 4X top view cameras
  - Side view camera

Test your samples here !



Corse (cm) to fine ( $\mu\text{m}$ ) z-positioning

Femtum Nano 2800 fiber laser

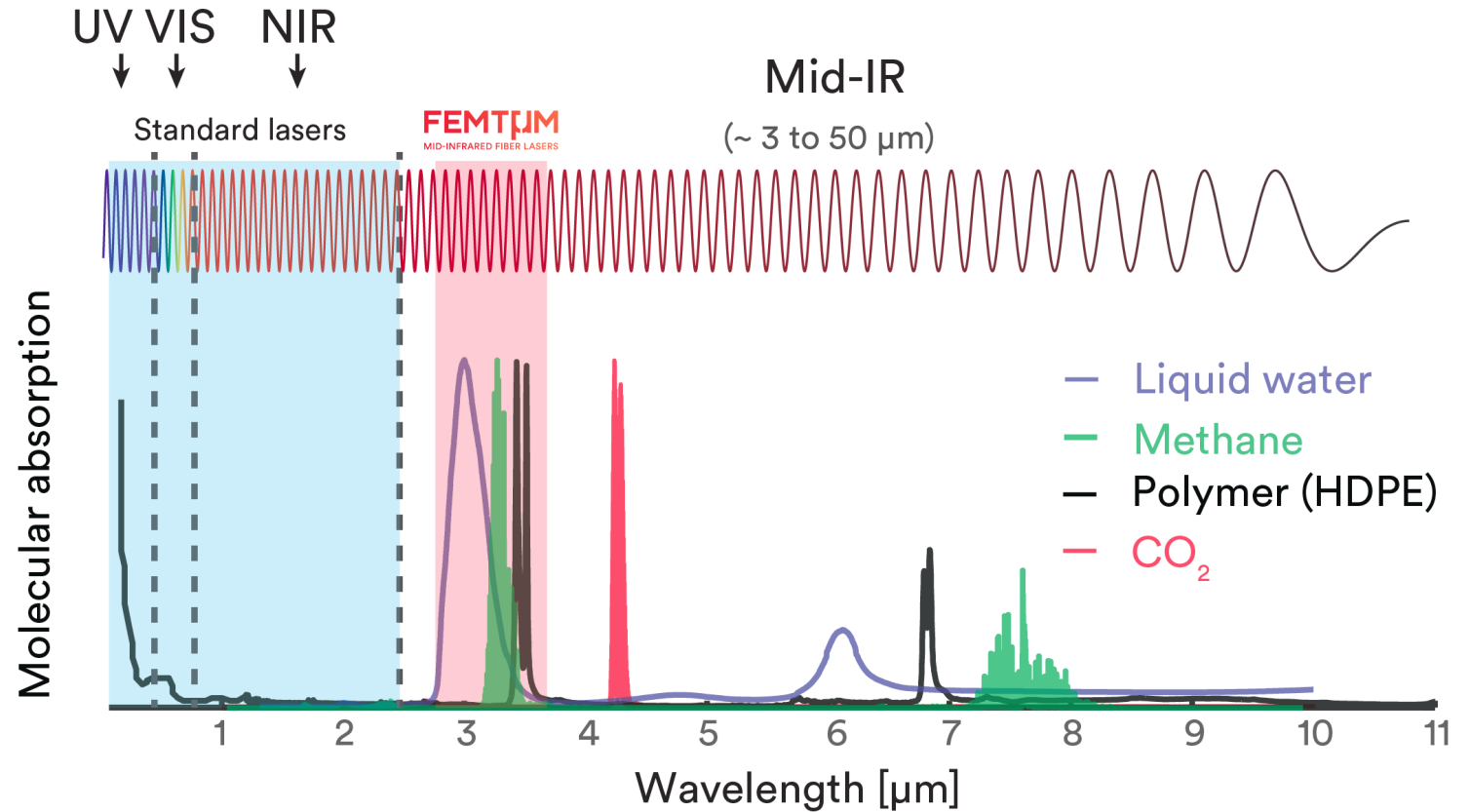
- Output collimator:
- Beam expander
  - Fast shutter / Pulse picker
  - Variable attenuator

- Aerotech positioning stages:
- Long travel range
  - Fine accuracy
  - High speed

Anti-vibration optical table

# Why is the 3 $\mu\text{m}$ range important?

Target strong molecular absorption bands



## Scientific

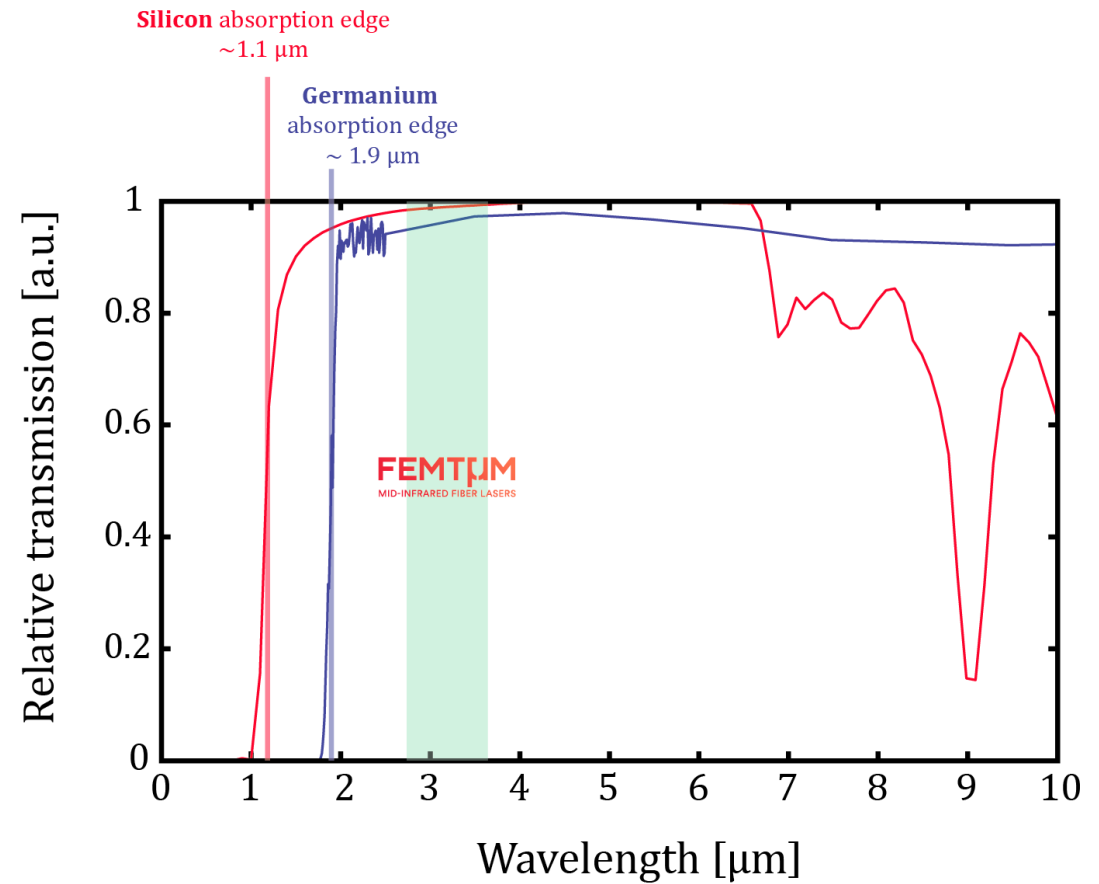
- Frequency combs
- IR spectroscopy
- IR imaging

## Industrial

- Polymer/organic material processing
- Selective processing
- Surgical procedures

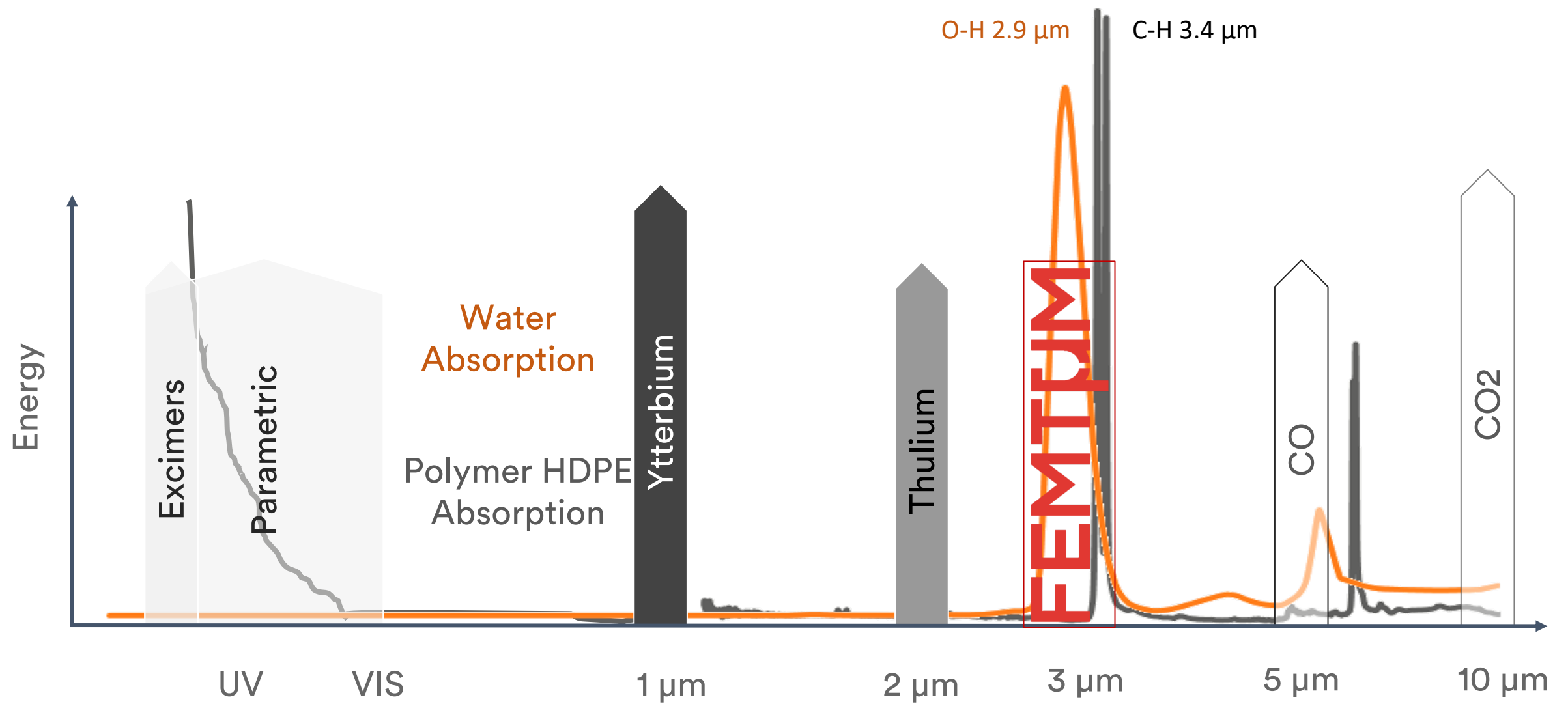
# Why is the 3 $\mu\text{m}$ range important?

High transparency region for semiconductors and nonlinear materials



- Semiconductor processing

# The only 3- $\mu\text{m}$ range industrial pulsed fiber lasers on the market

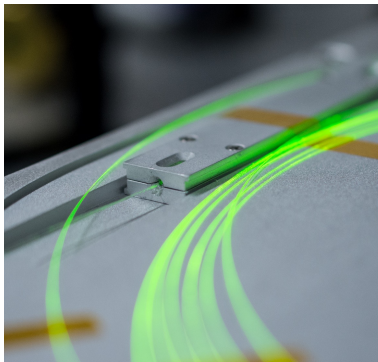


# The main ingredients to build the world's leading nanosecond to femtosecond fiber lasers in the mid-IR

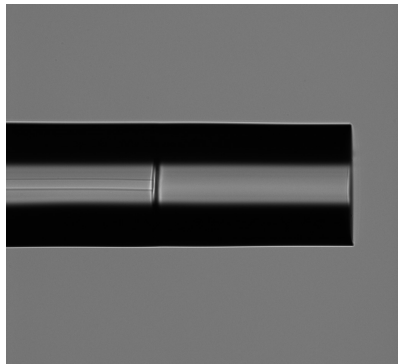
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## FG Fiber expertise

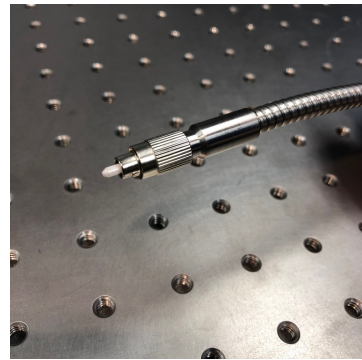
## Free-space mid-IR expertise



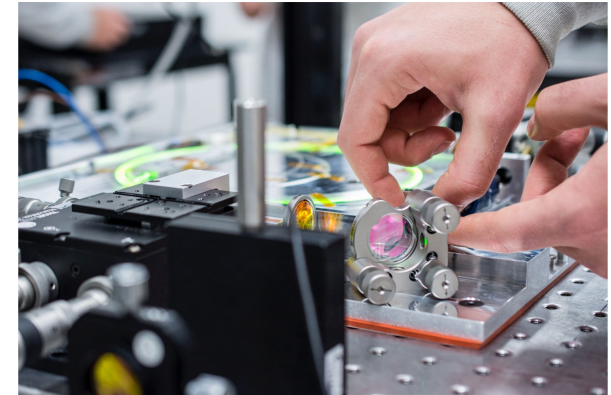
**SiO<sub>2</sub> to ZBLAN  
Combiner  
(Patent pending)**



**High power  
Mid-IR endcaps  
(Unique know-how)**



**Cable & connectors  
adapted for FG  
(Unique know-how)**



**Mechanical parts designed  
for high power and high stability**

# Our main products: Nanosecond to femtosecond fiber lasers

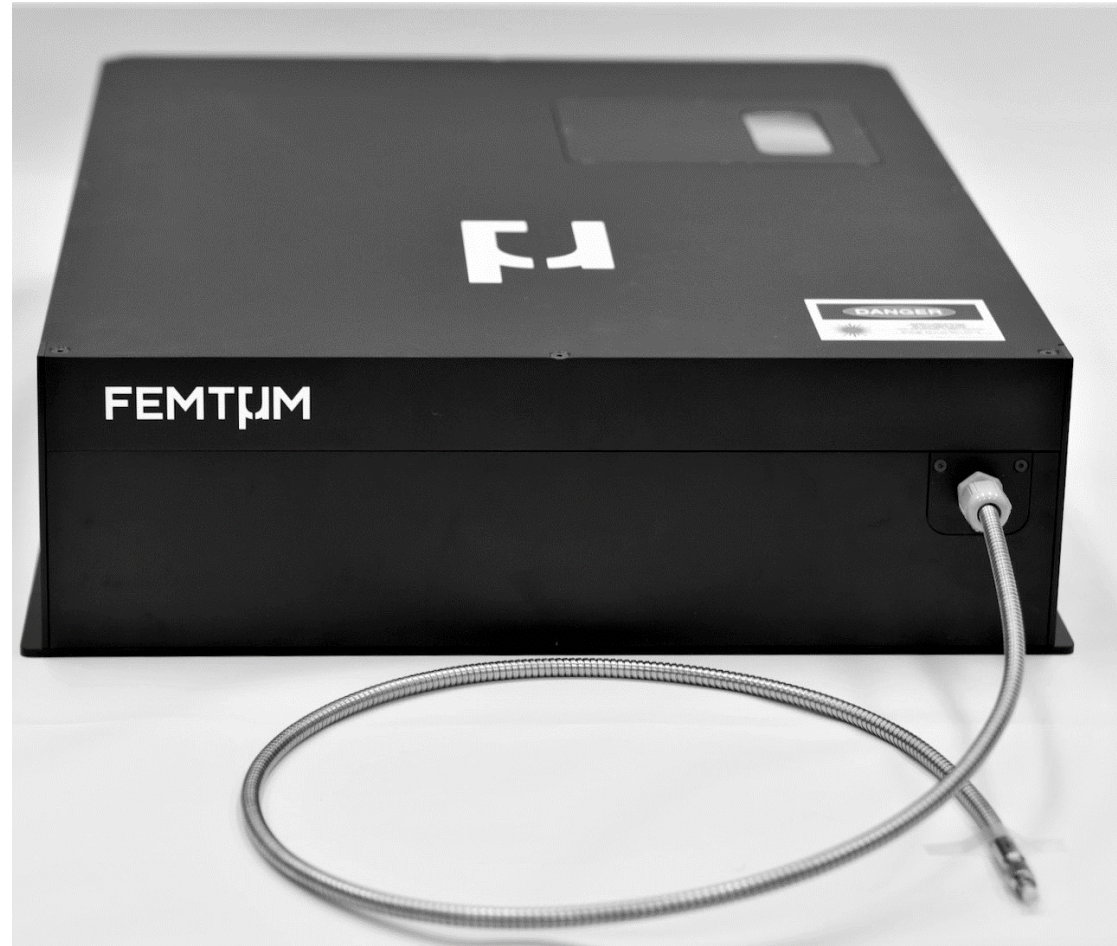
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**Femtum Nano 2800**



**Femtum Ultratune 3400**



Femtum Ultratune 3400

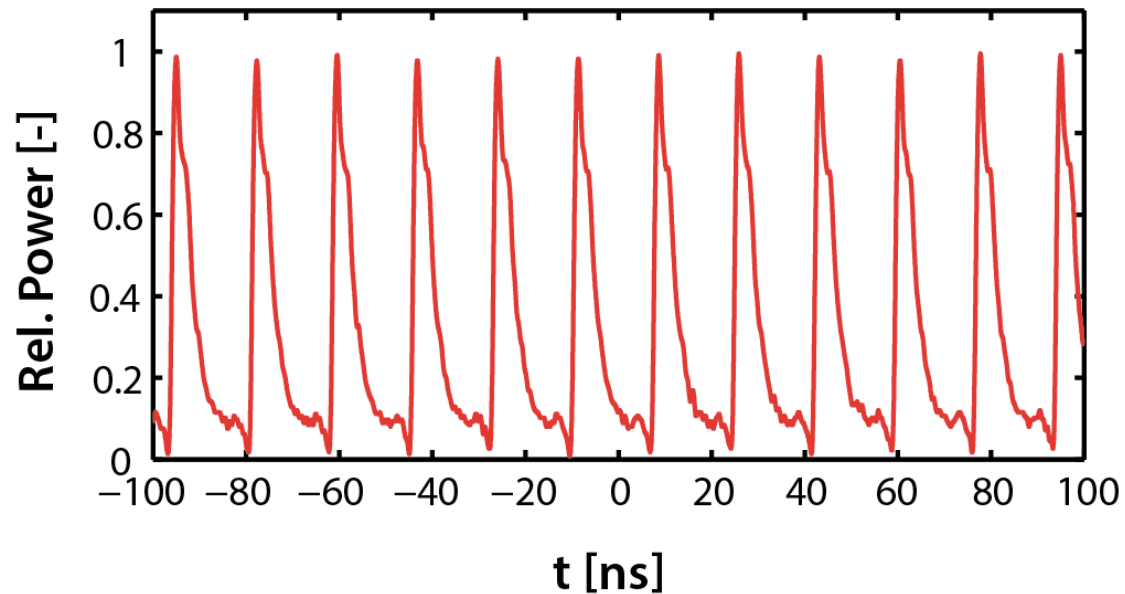


# Ultrafast tunable laser from 2800 to 3400 nm

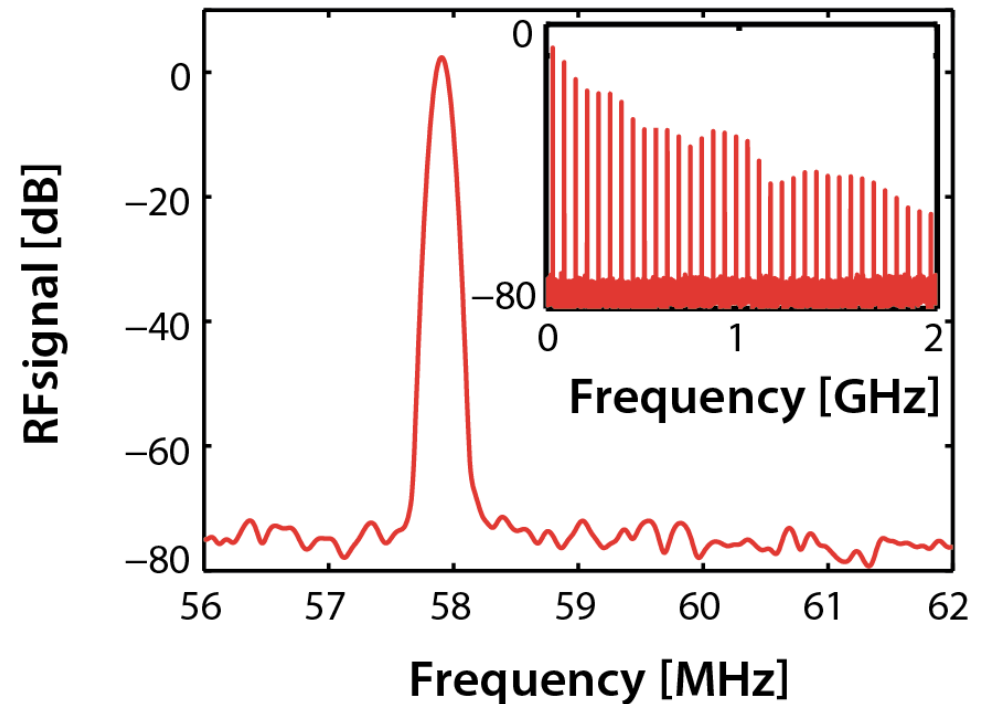
## Temporal properties

- Pulse durations < 300 fs
- Repetition rate up to 50 MHz
- Pulse energy > 10 nJ
- Peak power > 200 kW
- Average power > 250 mW

### Pulse train



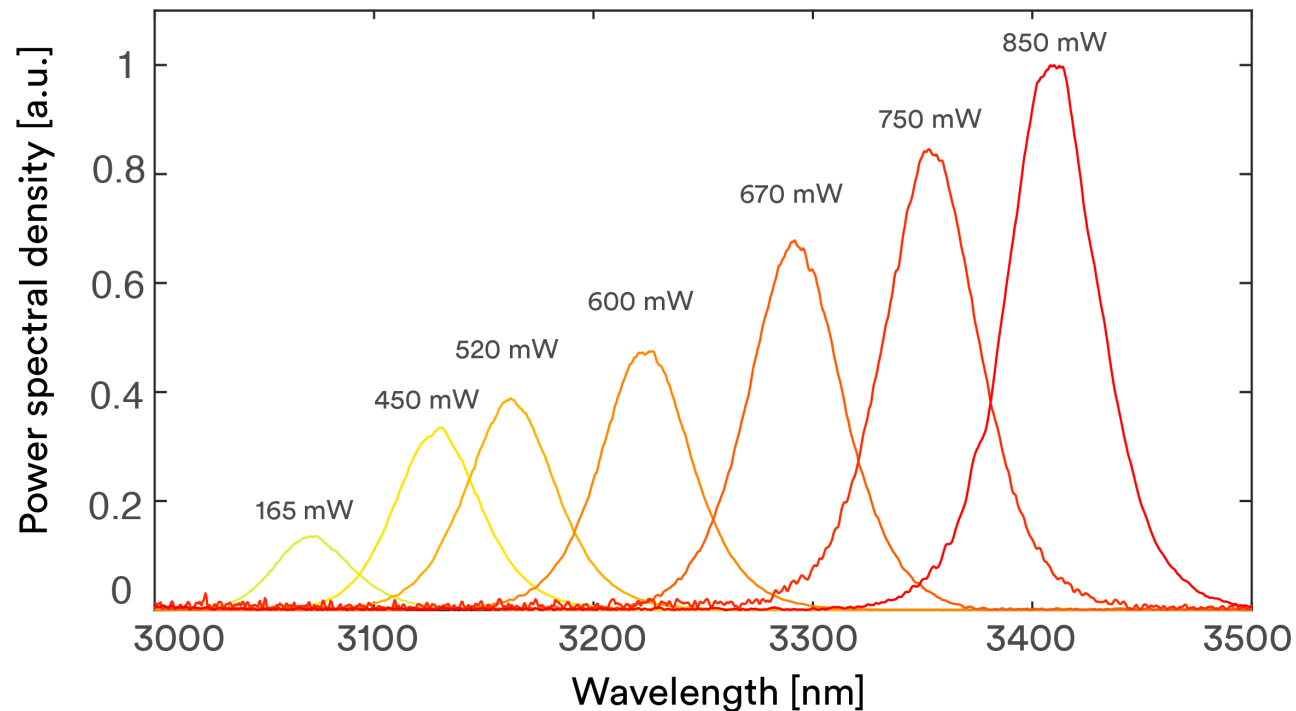
### RF spectrum



# Ultrafast tunable laser from 2800 to 3400 nm

## Spectral properties

- Continuous tuning over > 400 nm
- Spectral bandwidth up to 50 nm
- Pure soliton spectral shape



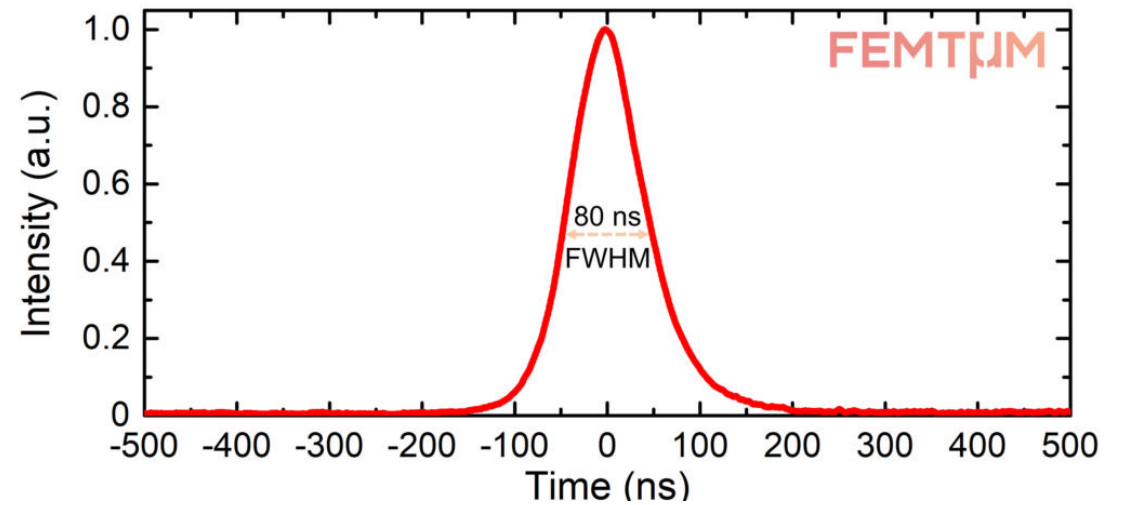
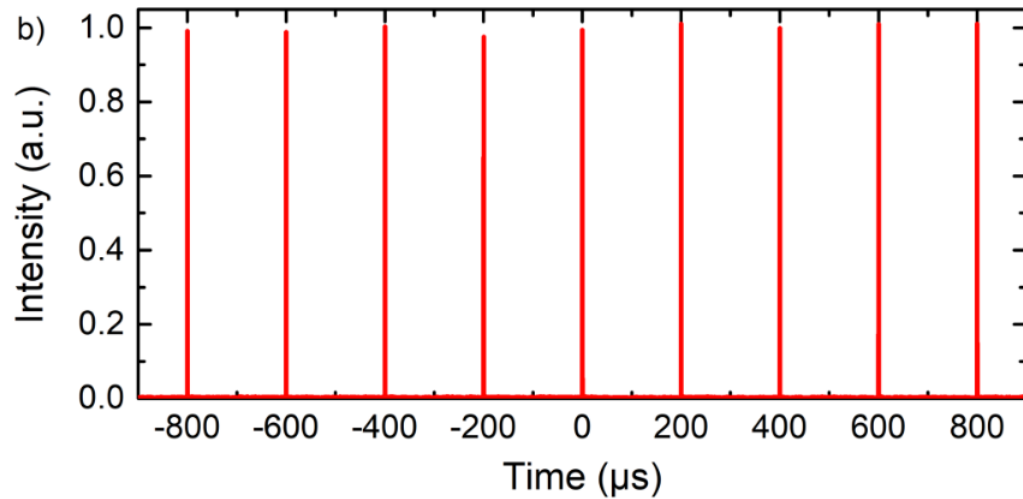


Femtum Nano 2800

# Nanosecond fiber laser around 2.8 $\mu\text{m}$

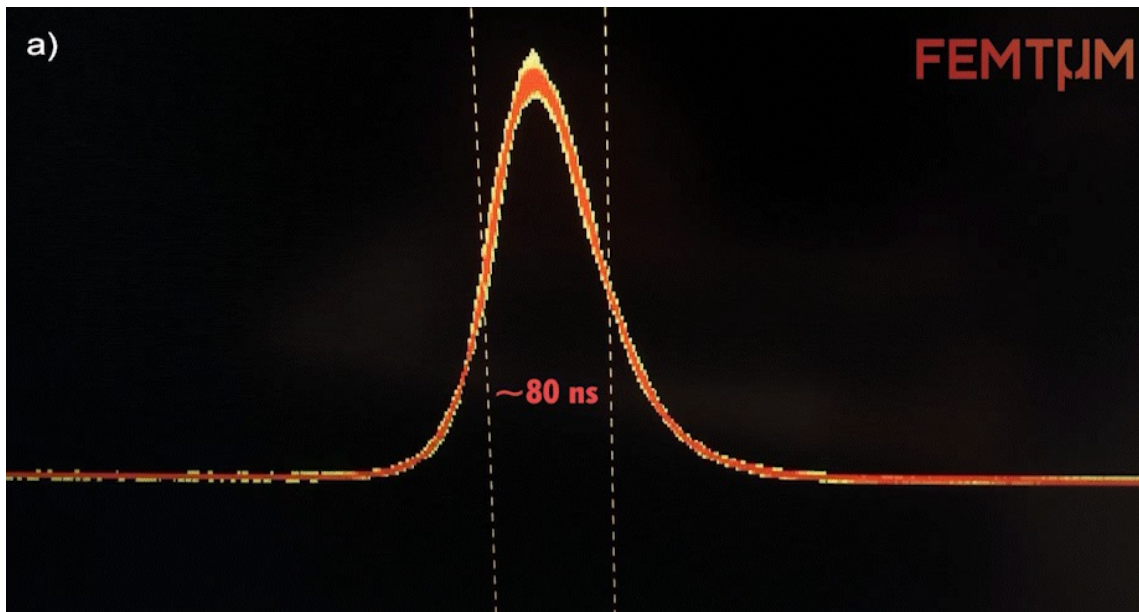
## Temporal properties

- Pulse durations : < 200 ns
- Repetition rate : up to 50 kHz
- Pulse energy : up to 100  $\mu\text{J}$
- Average power : up to 5 W

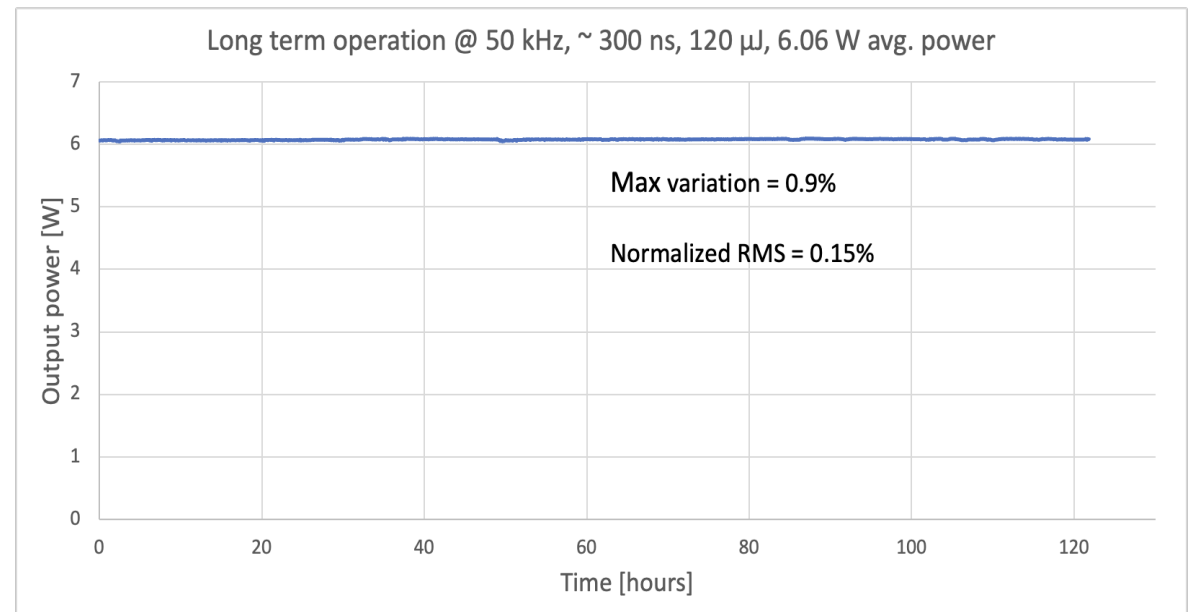


# Nanosecond fiber laser around 2.8 $\mu\text{m}$

## Pulse-to-pulse stability



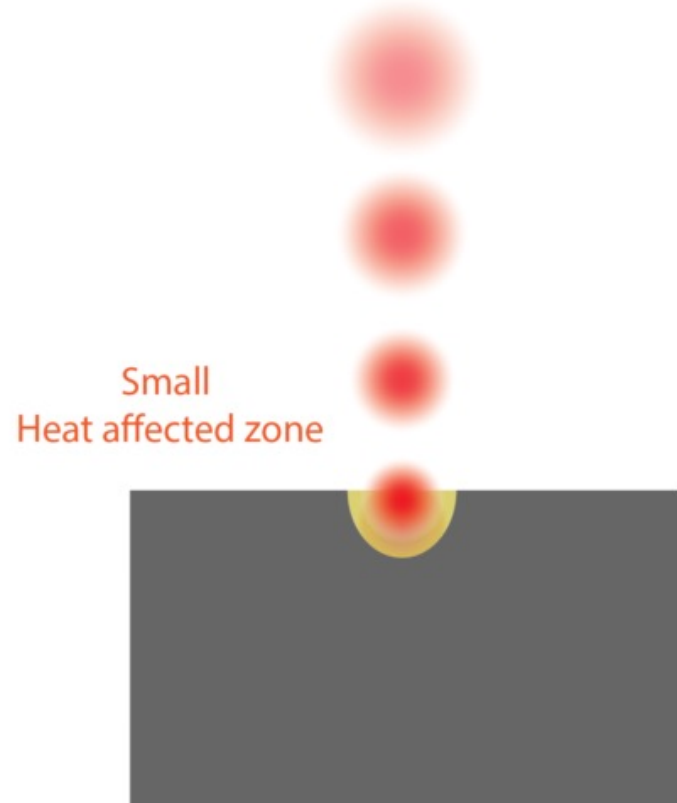
## Long-term stability with 6W average power



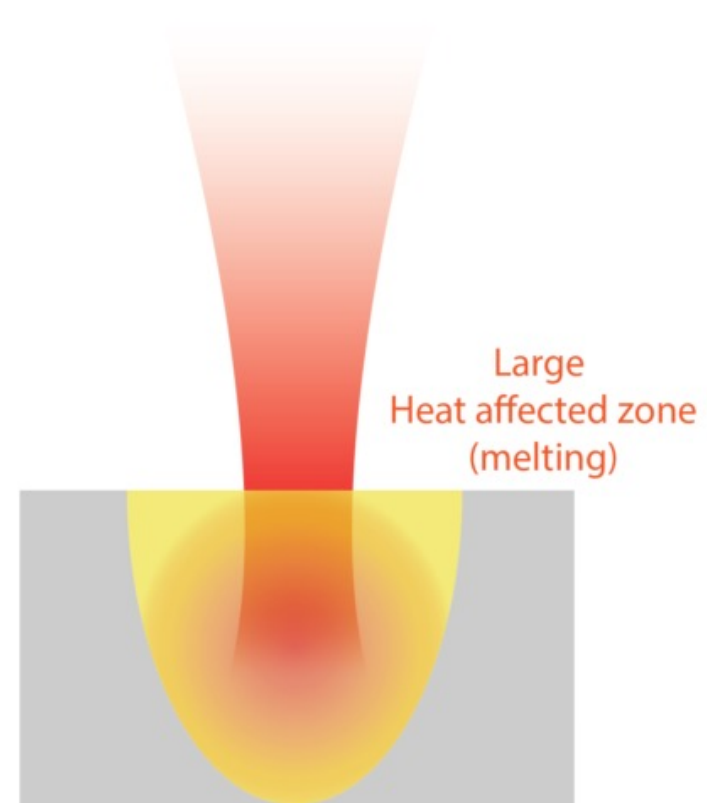
# Industrial applications

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Short pulsed  
lasers



Continuous  
lasers

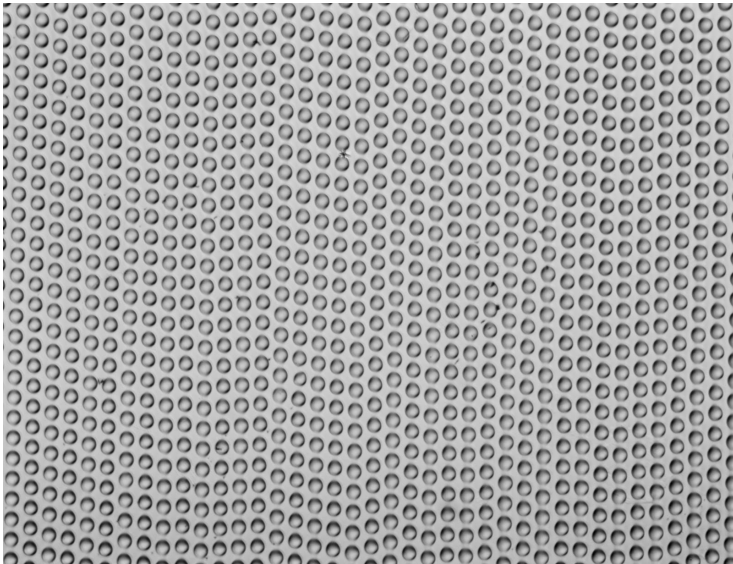


# Industrial applications

## Micro-bump/texturation



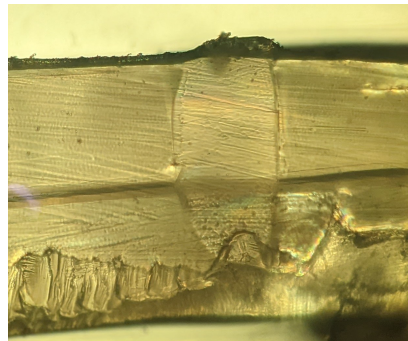
Micro-lens on PC



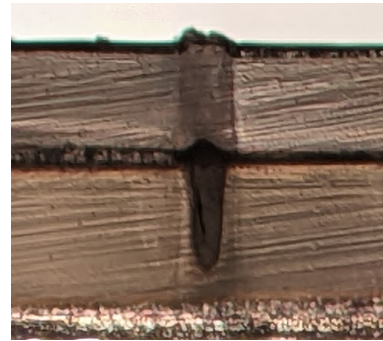
## Welding



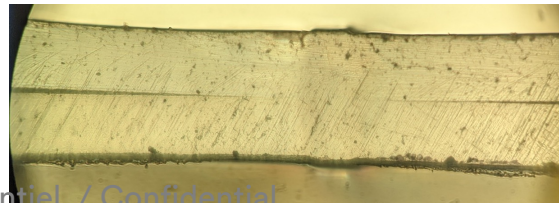
PET-PET welding  
180-180  $\mu\text{m}$  thick



PET-PC welding  
180-125  $\mu\text{m}$  thick



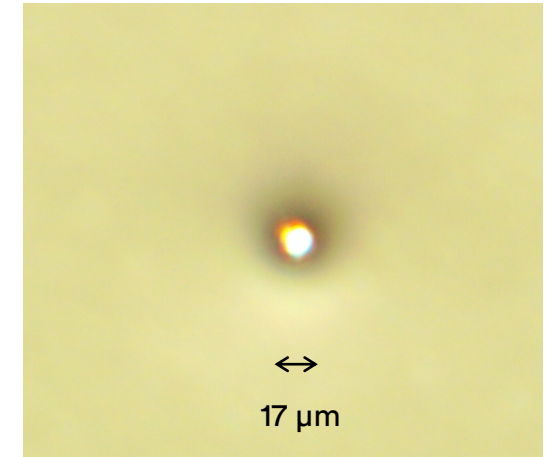
PC-PC welding  
125-125  $\mu\text{m}$  thick



## Ablation/drilling

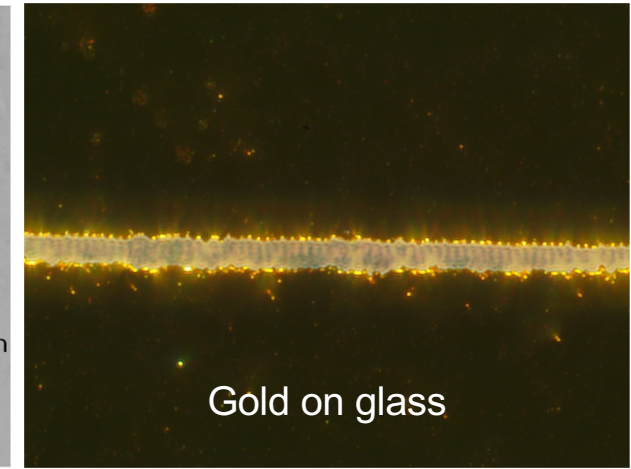
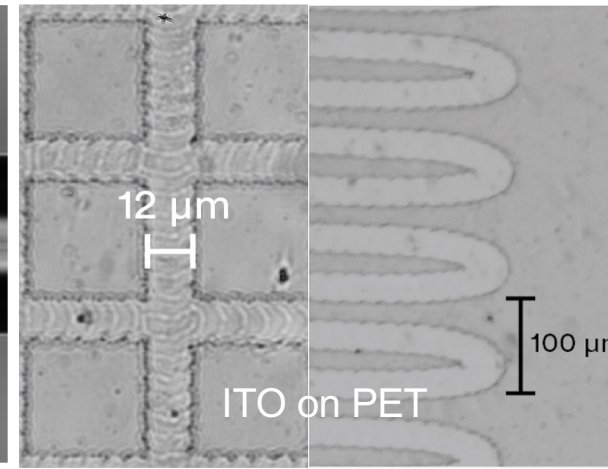
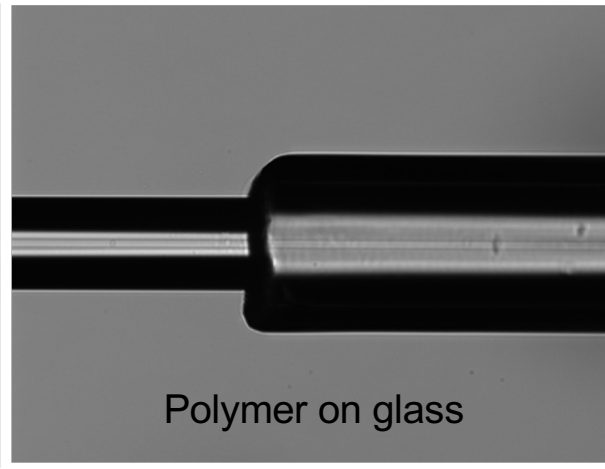
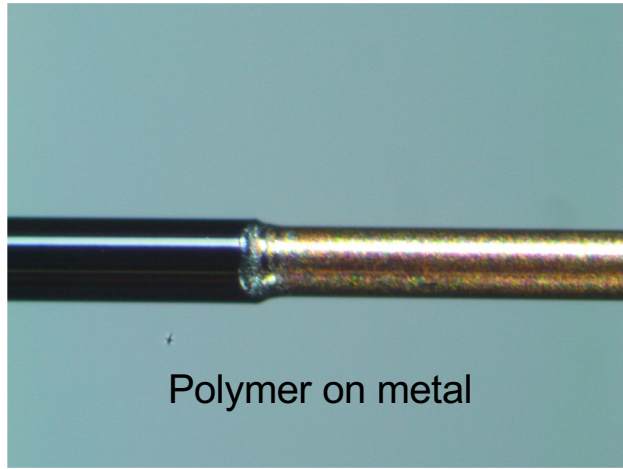
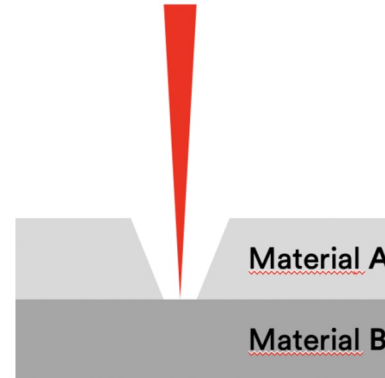


Polyurethane (PU) drilling  
25  $\mu\text{m}$  thickness



# Industrial applications

Selective laser  
processing

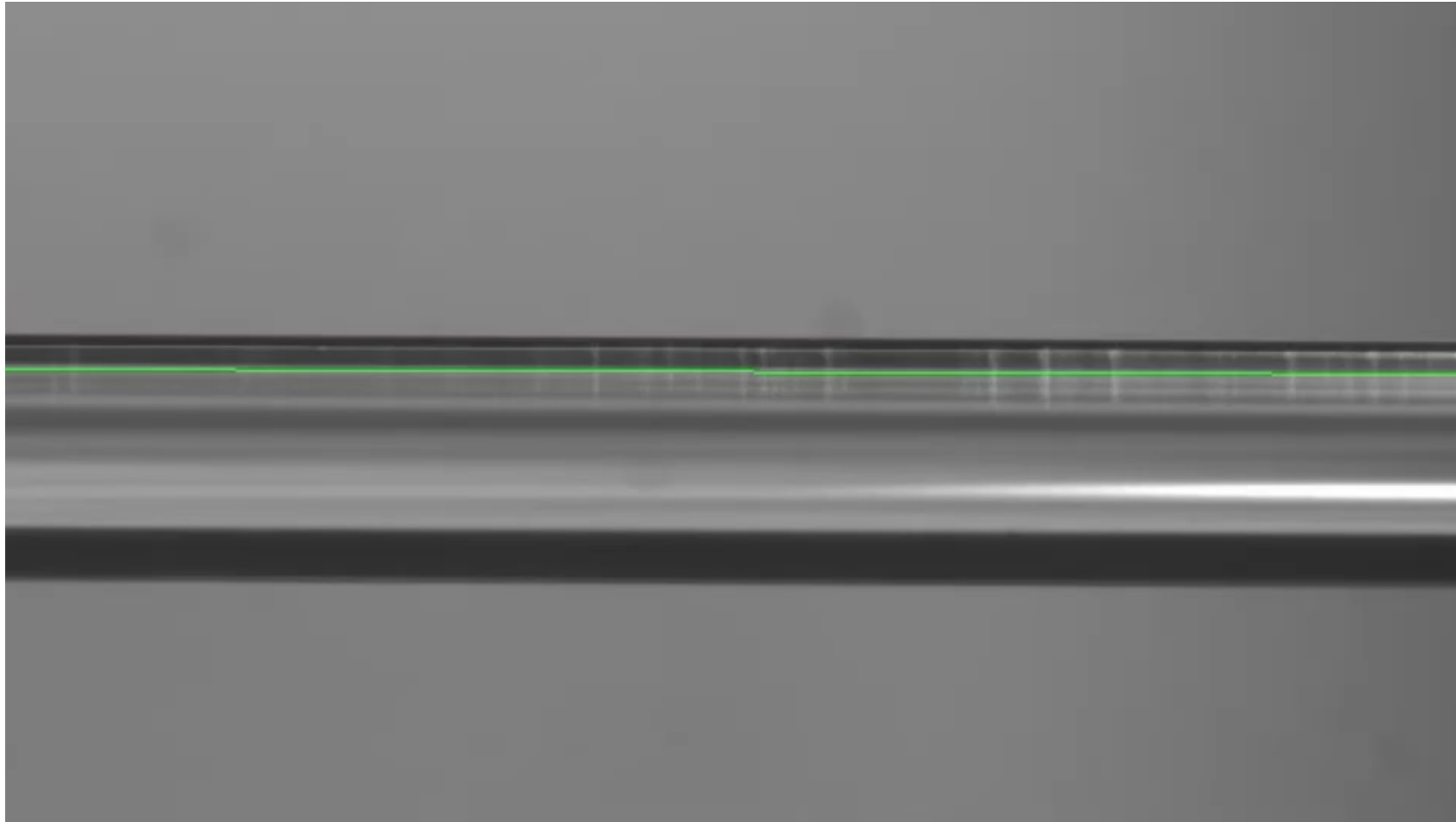




# Industrial applications

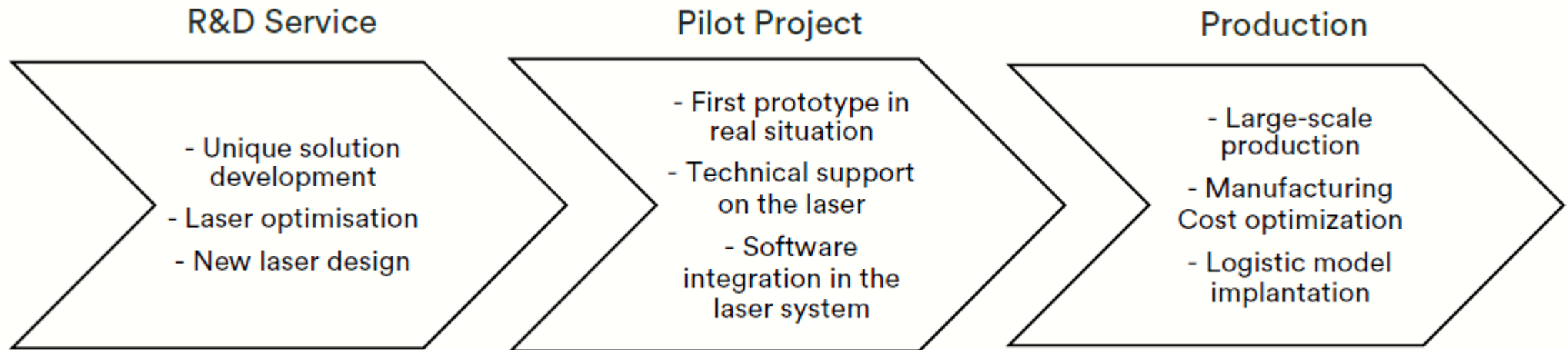
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Precise fiber optics stripping in real time



# Our business model

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A glowing green neon ring graphic on a black background. The ring is composed of several overlapping, slightly offset loops, creating a sense of depth and motion. The light is bright and vibrant, with some darker green shadows within the loops.

**THANK YOU**

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