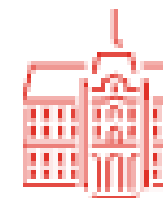

Innovative Laser and Photonics Technologies: Flexible Laser Systems, Digital Processing, and Advanced Optical Fibre Solutions

Rok Petkovšek, UL FME



UNIVERZA
V LJUBLJANI



TECOS



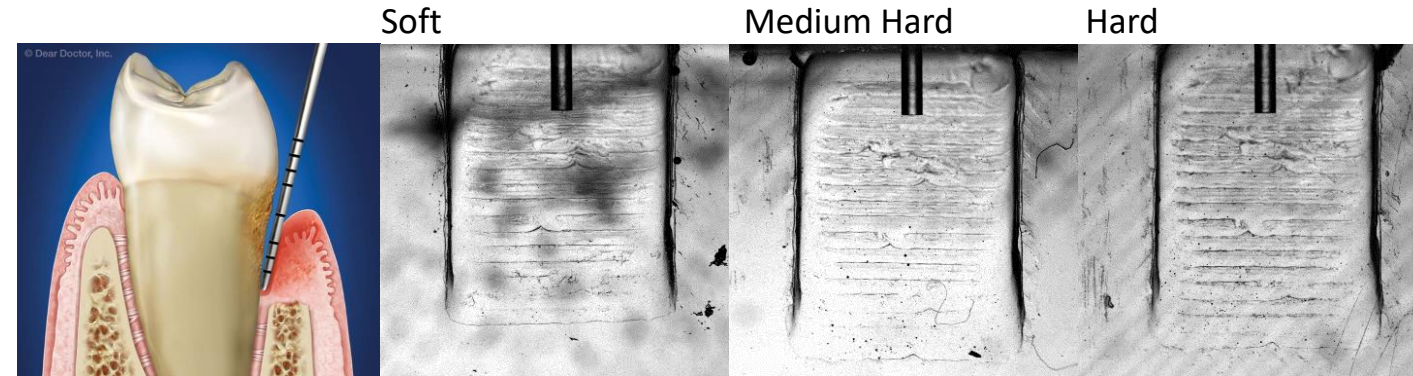
Partnership KET Photonics



- In Slovenia, we have state-of-the-art knowledge in the fields of laser sources and its applications in the industry, medicine, science and others.
 - Partnership **KET Photonics** has affiliated companies (LPKF, Fotona, Optotek, Plasil and Lumentum) and academic research organizations (University of Ljubljana, Institute Jozef Stefan, University of Maribor)
 - Research organizations work in close cooperation with industry:
 - common project
 - equipment
 - Companies control the entire value chain:
 - from research to sales to end customers
-

R&D for laser applications in medicine

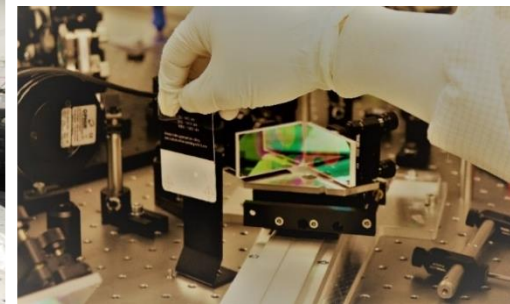
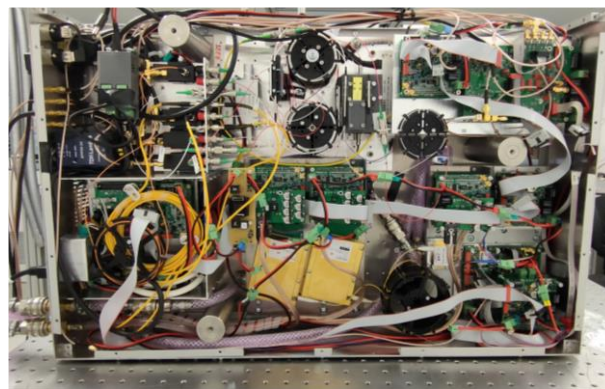
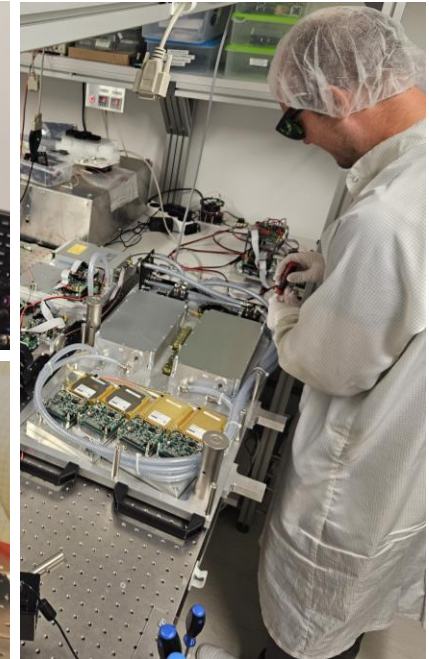
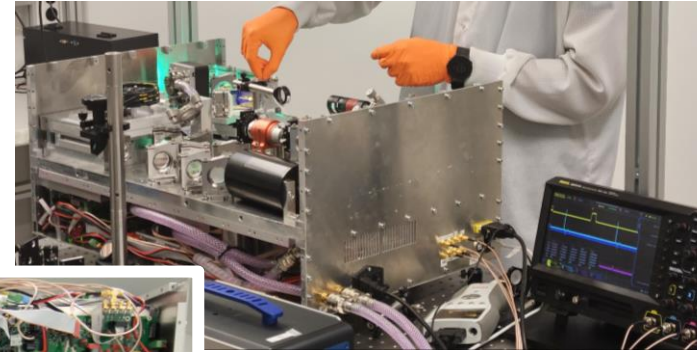
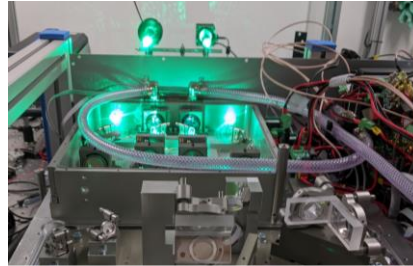
- Ophthalmology
- Laser induced highly controllable cavitation
- Dental applications:
Laser cleaning of periodontal pockets



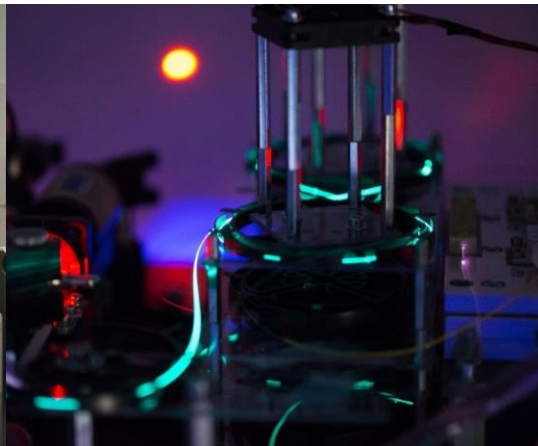
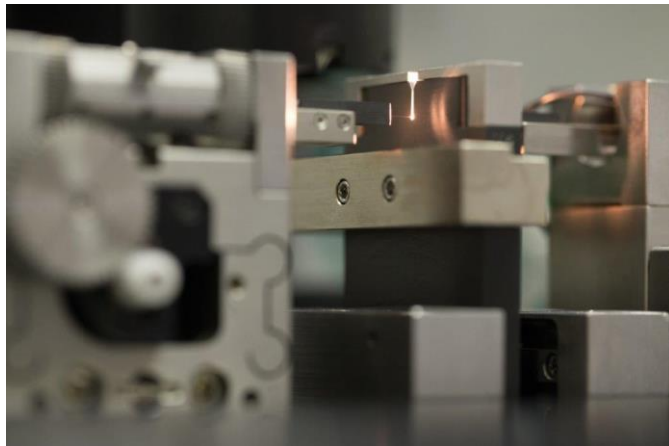
R&D of highly adaptable lasers

Lasers adapted for niche applications with specific properties:

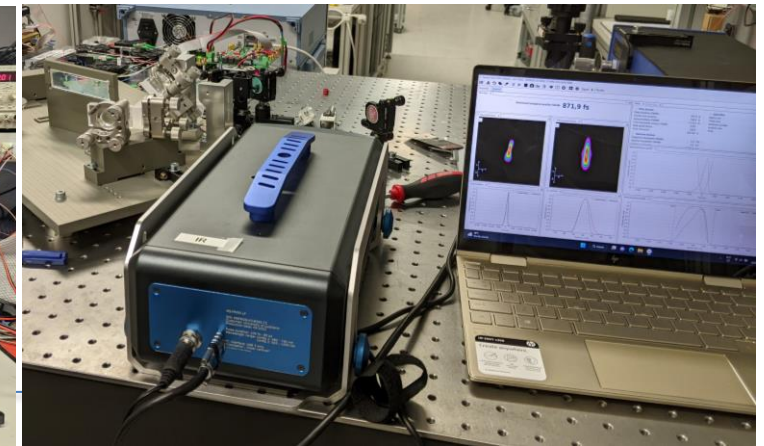
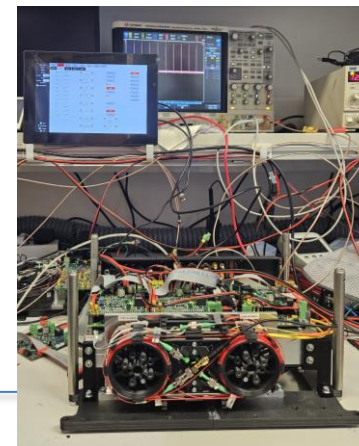
- Pulse parameters on demand
- Multibeam lasers
- Precise synchronizations



■ Fiber technologies



■ Laser characterization



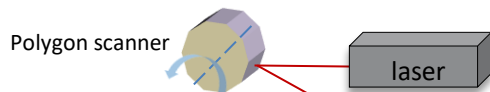
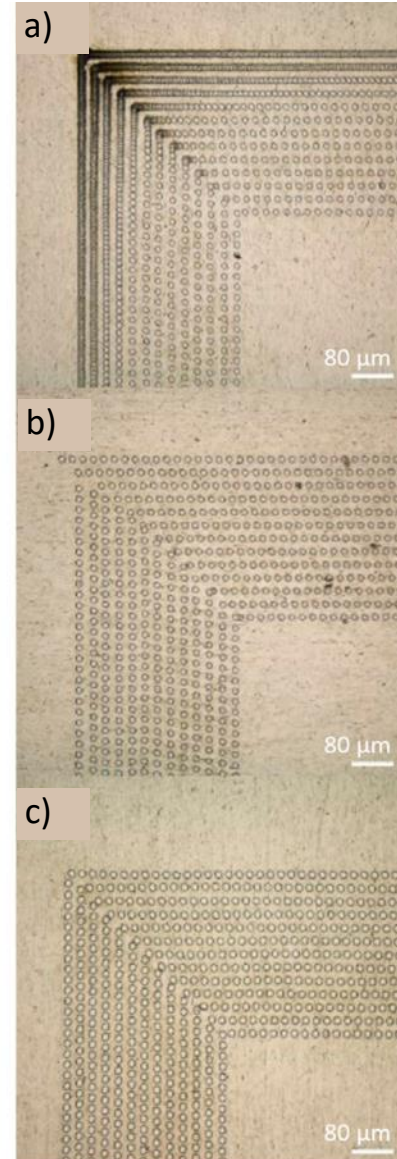
Applications in laser processing

- Customized precise surface processing:
 - processing with pulse on demand (POD)
 - Hybrid processing
 - Specialized surface features
 - Biomimetic surfaces – Shark skin

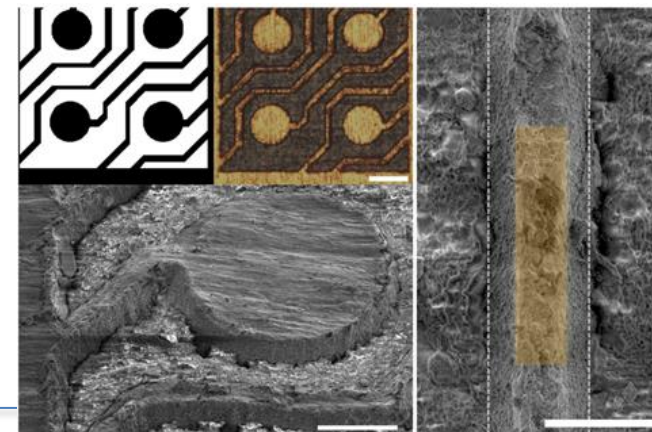
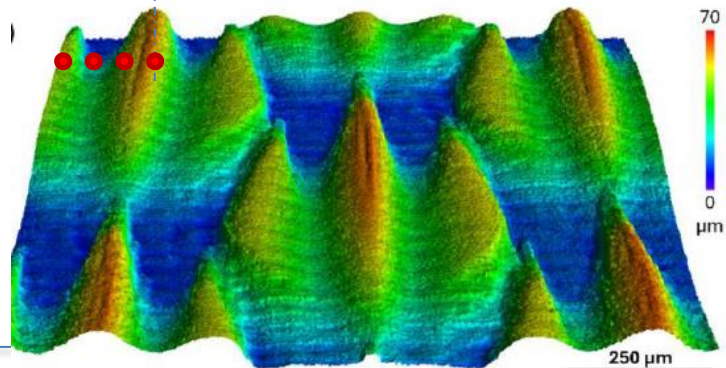
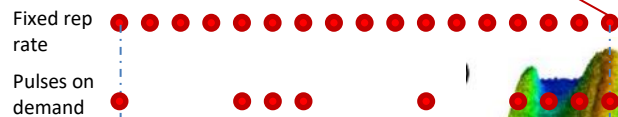


Conventional

Skywriting



Constant speed

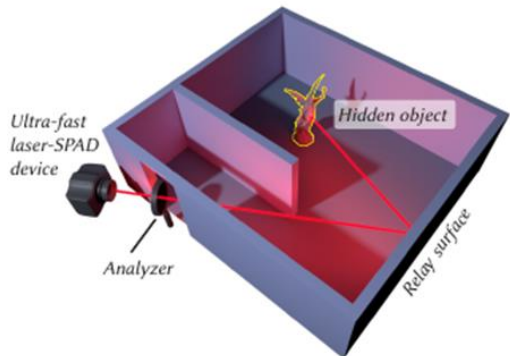
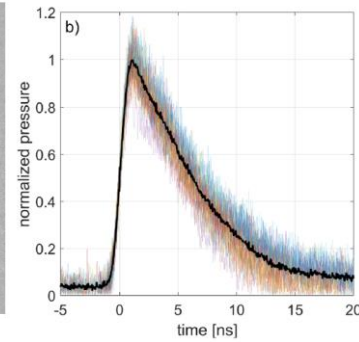
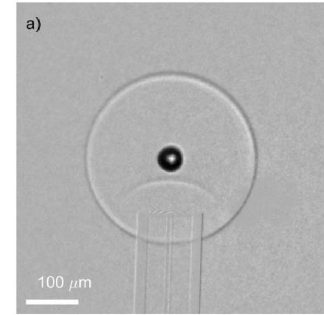
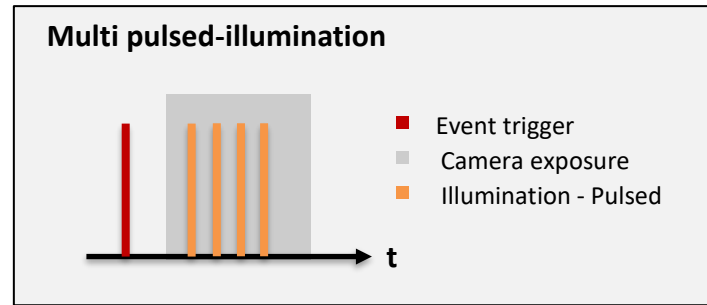


POD

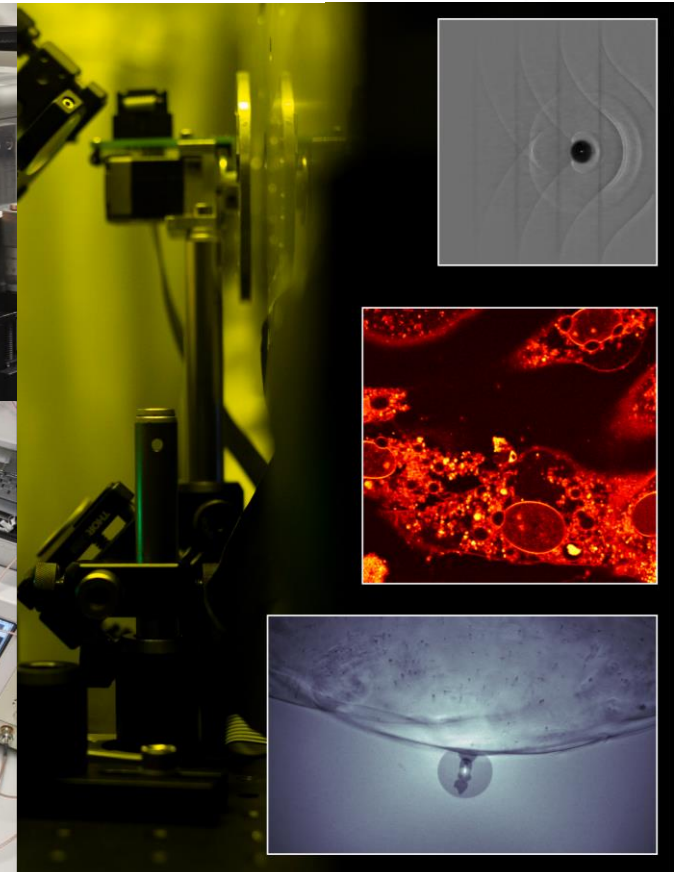
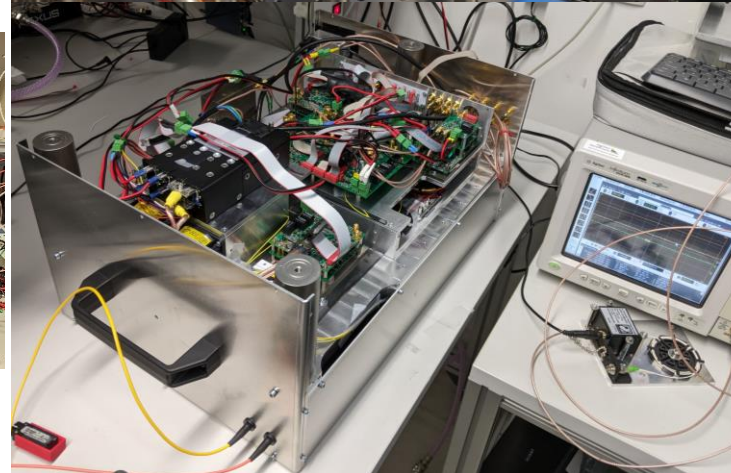
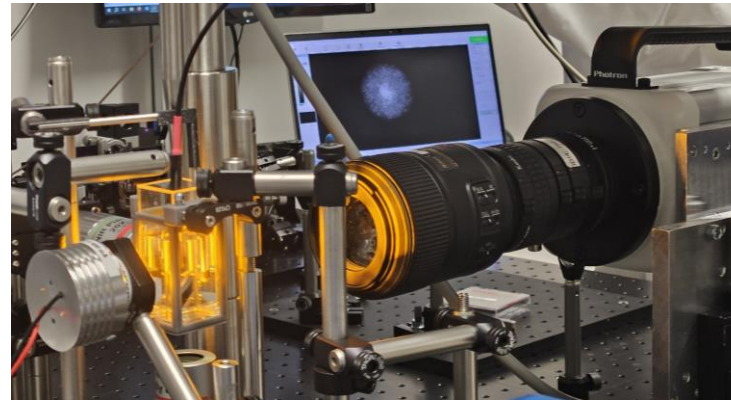
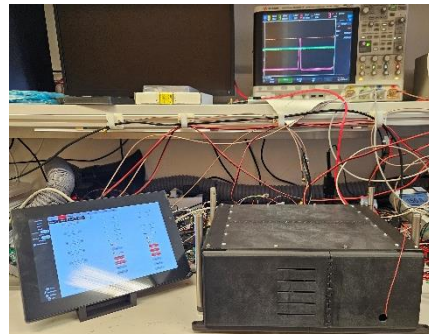
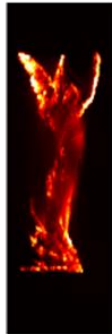
Laser for application in science and other fields

- **Photonic devices for advance measurement**

- Advanced illumination systems increasing the state-of-the-art high speed camera capabilities
- Optical pressure sensors
- Non line of sight imaging



<https://doi.org/10.1145/3680528.3687575>



Laser system for medicine R&D and production



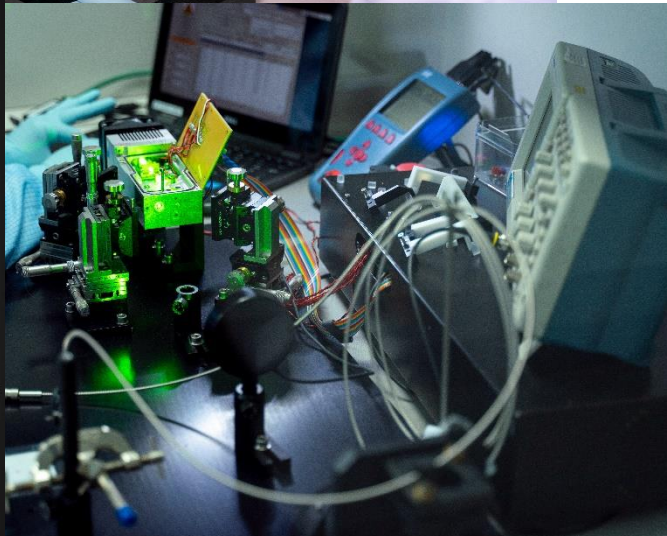
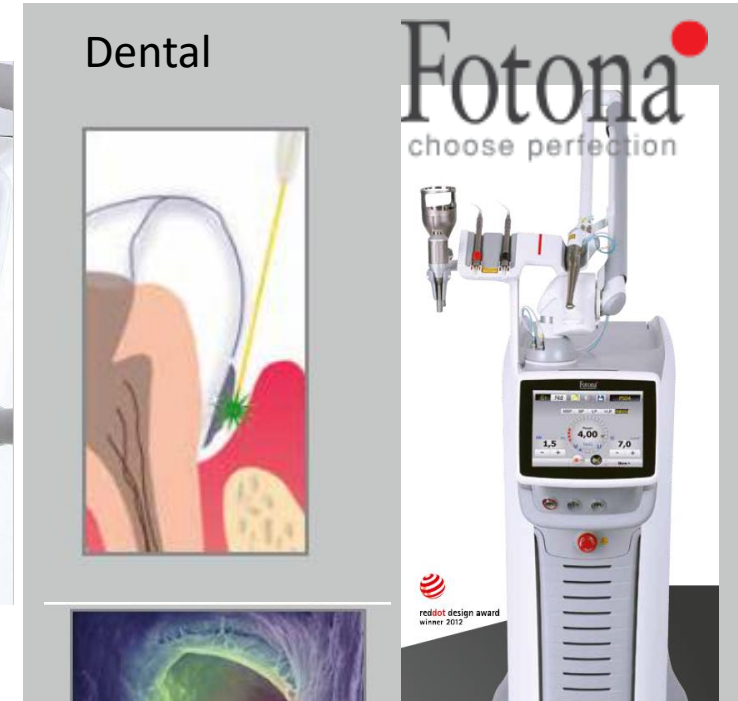
Laser systems for:

- **Ophthalmology:**
 - posterior capsulotomy,
 - iridotomy

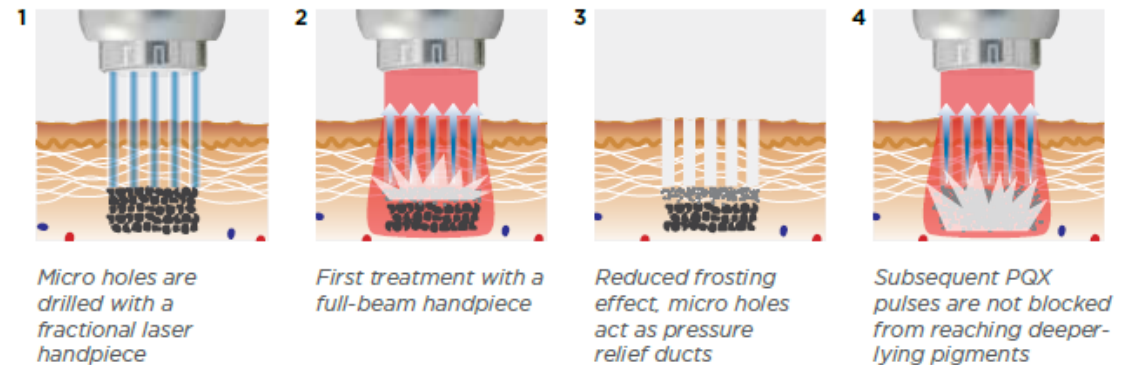


Laser system for:

- **Esthetics**
- **Dental**



Fotona FracTAT® tattoo removal technology



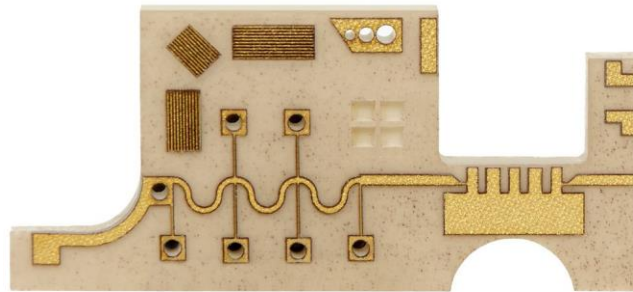
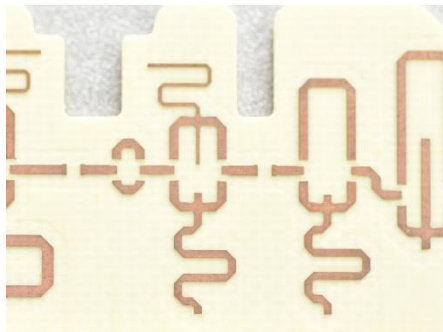
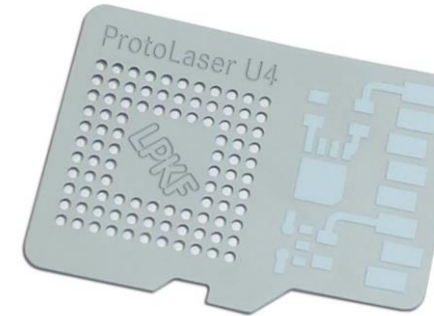
Laser system for industry: R&D and production



- Niche products for prototyping and small production runs
- high-density electronics PCBs processing using laser.
- Safe with no hazardous chemicals used.



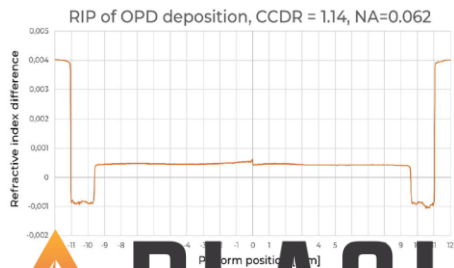
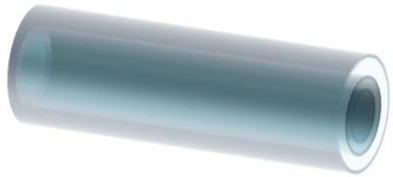
ProtoLaser U4



Key technologies for fiber lasers

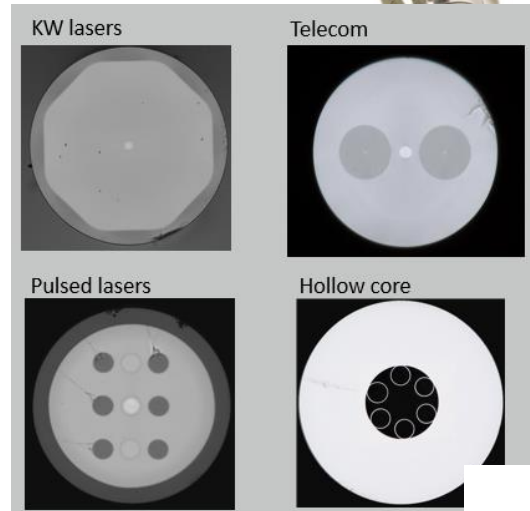
Developing and building equipment for producing:

- Fiber Preforms
- OPD – Outside Plasma Deposition System
- Plasma preform polishing
- Tripple clad fibers



Developing and producing:

- Specialty Optical Fibers
- Laser Components
- Specialized equipment and systems for development and production





Thank you for your attention!

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