



## **Femtika and Mesomorph.**

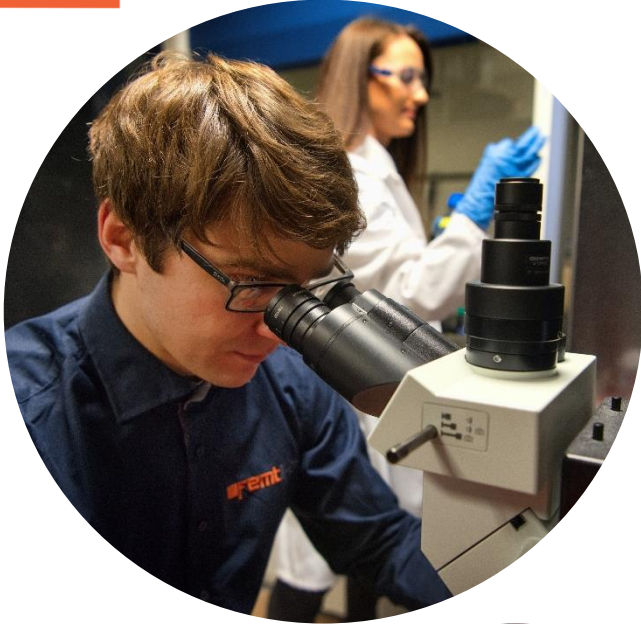
All-in-one machine for hybrid technologies enabling high value added multi-scale integrated microoptoelectronics - H2020 project

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6 May 2021



# Femtika overview



- Spin-off from Vilnius University Laser Research Center, working in the area of **laser micro-fabrication**;
- Founded in 2013;
- Based in Sunrise Valley, Vilnius, Lithuania;
- Employees: 39 (4 PhD, 5 PhD students);
- Various R&D projects with EU partners (H2020, Eurostars);
- Member of Lithuanian Laser Association, EPIC.



# Combination of additive-subtractive femtosecond manufacturing

0.1

Intensity (TW/cm<sup>2</sup>)

100



## 3D Laser Lithography



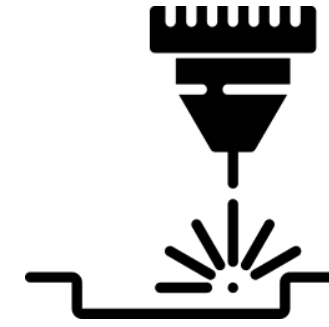
- Sub-diffraction limited resolution
- True 3D fabrication
- Huge variety of available materials

## Selective Glass Etching



- Free-form 3D glass structures
- ~ $\mu\text{m}$  level precision
- mm-cm structures achievable

## Surface Structuring/Ablation

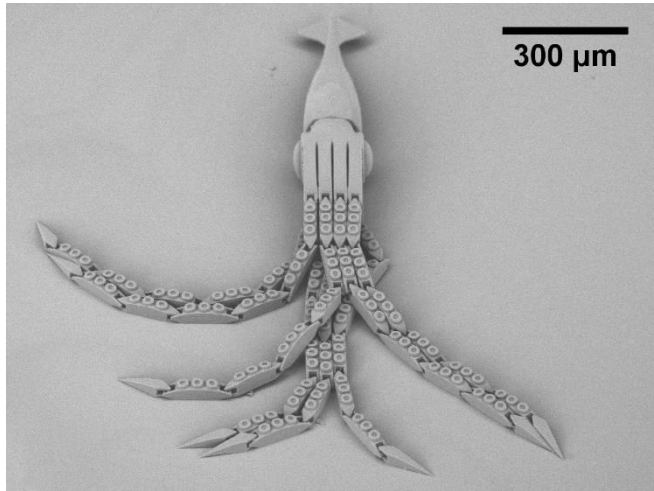


- Cutting, drilling, marking and surface texturing
- Clean ablation edges
- Applicable to all materials

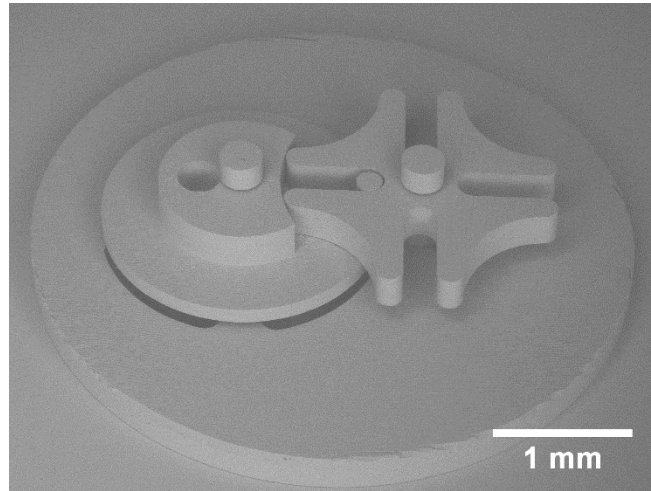


# Capabilities of femtosecond lasers

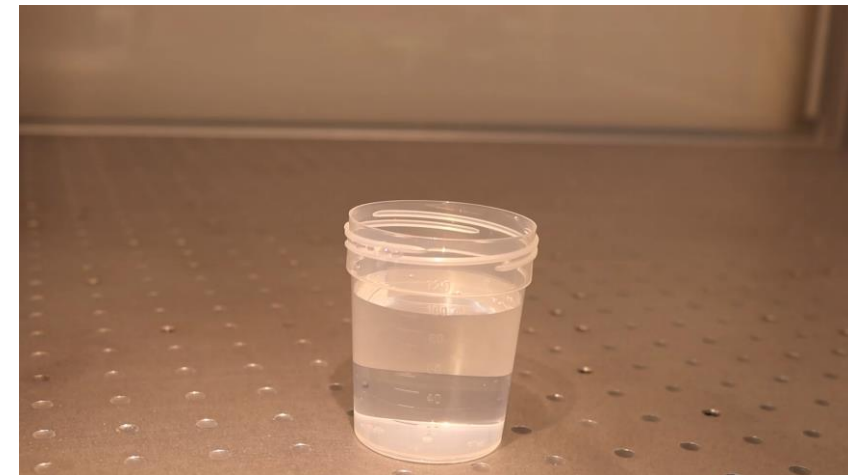
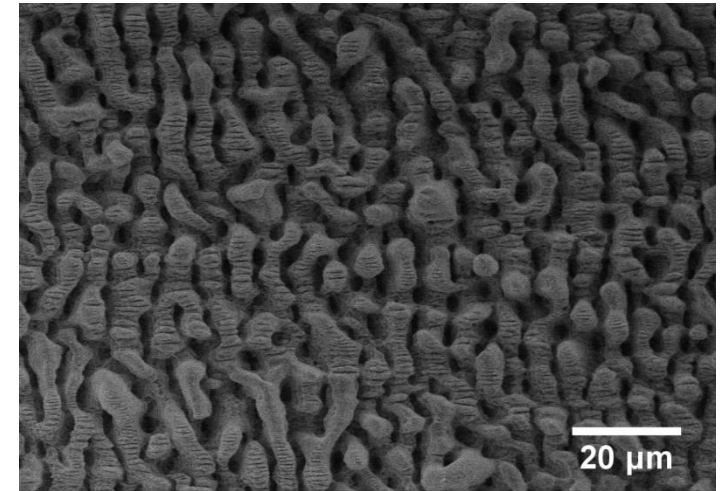
Polymer



Glass

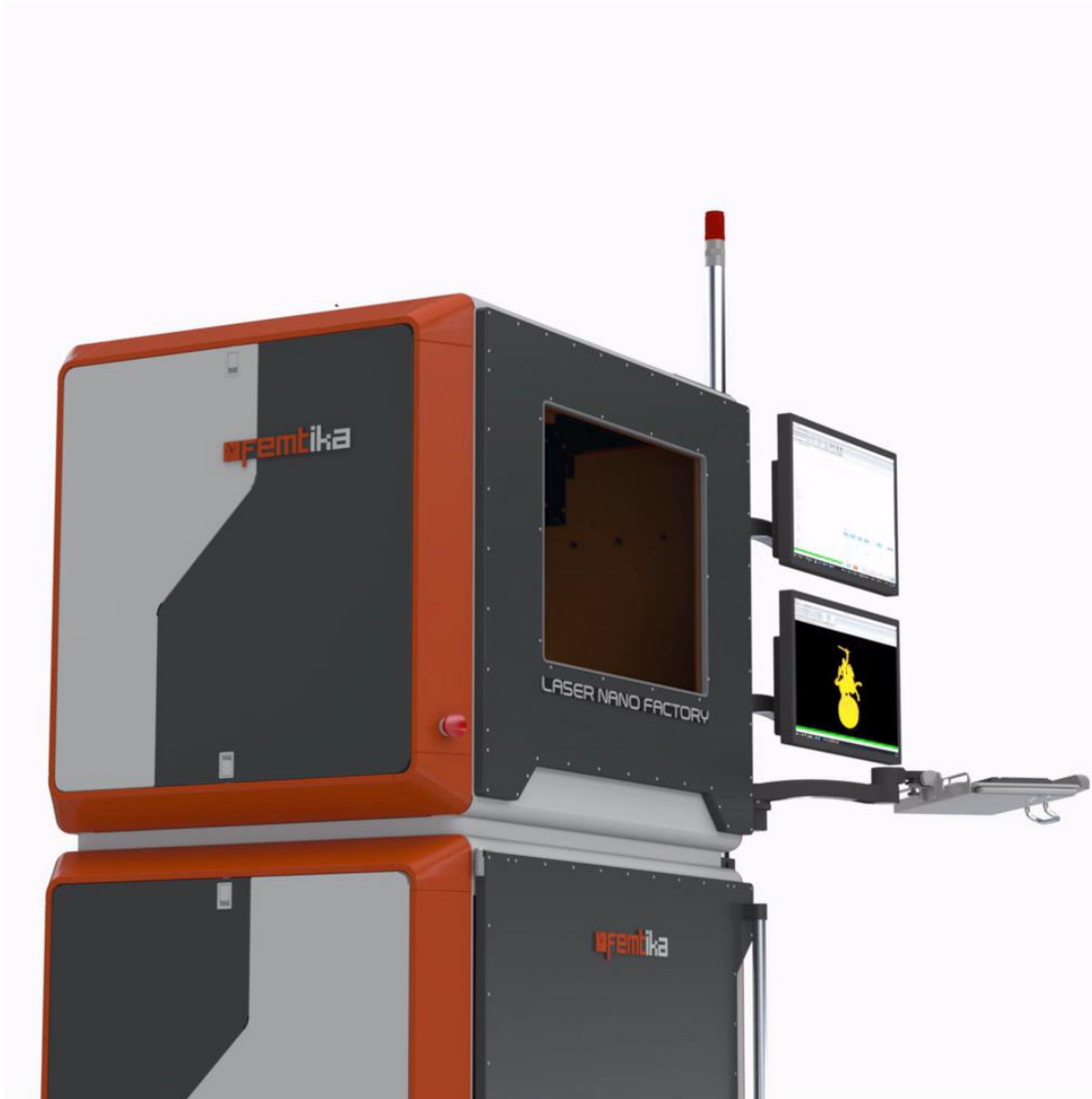


Metal





# Laser Nanofactory



- Amplified fs laser allows to combine **additive** and **subtractive** manufacturing
- **Wide tunability** enables efficient fabrication of micro-nano structures using **huge range of materials** (polymers, glasses, metals, ceramics, etc.)
- Stitching-error-free manufacturing over the **entire working field** (160 x 160 x 60 mm)
- **Femtika's own software 3DPoli** for the full control of related devices (both: manual and from user defined scripts)
- **Add-ons** (for instance, optical-fiber holders) and is **customizable** (as a versatile optical characterization setup)
- System is **modular, can be adjusted** under requirements and integrated into automatic production line





# How we work

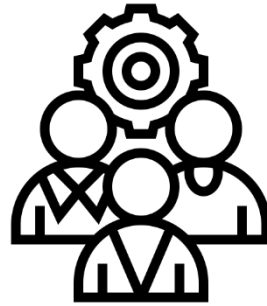
## Research



- Research of customer specific micro-structure fabrication method;
- Fabrication of microstructure prototype;
- Measurement and alignment with technical requirements.



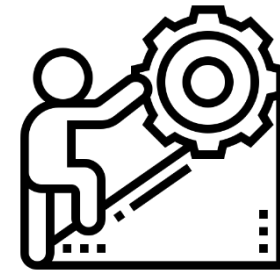
## Development



- Development of micro-structure fabrication process;
- Development of mass production fabrication design;
- Development of needed machinery and automation;
- Batch production of product.



## Installation

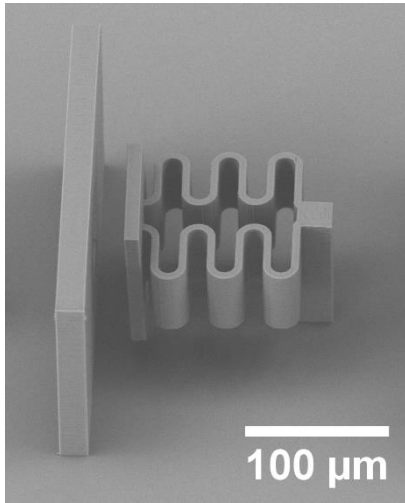


- Evaluation of site requirements and site preparation;
- Machinery manufacturing;
- Installation on site, if needed inside of existing production process;
- Training of users.

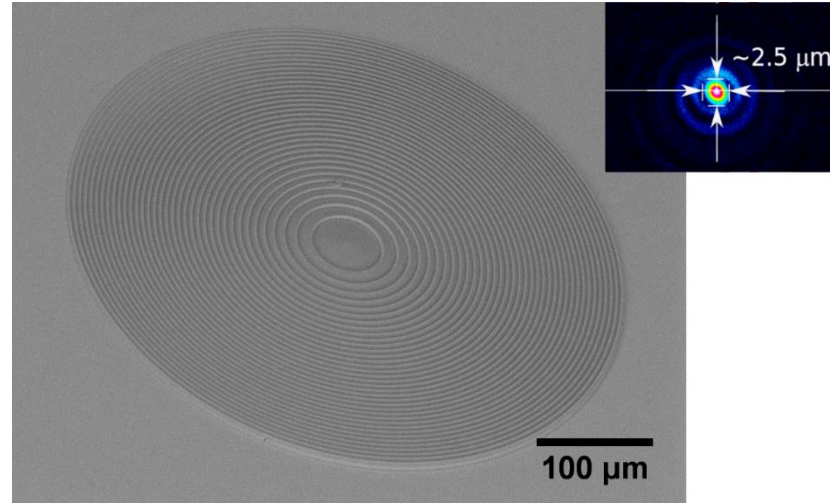


# Applications

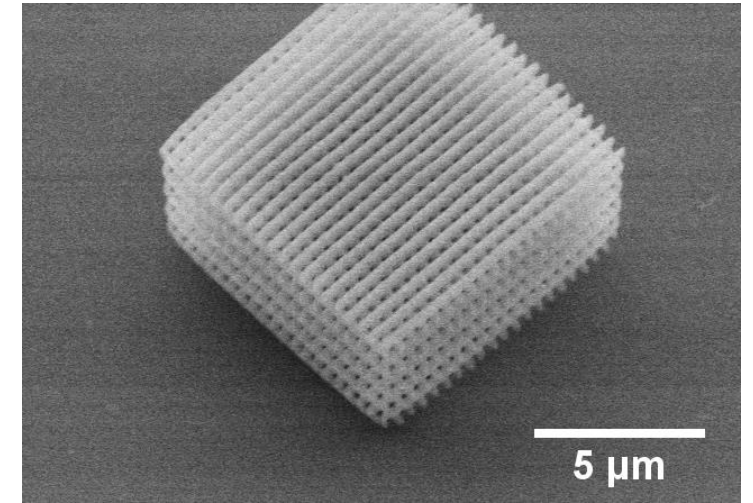
## Sensors



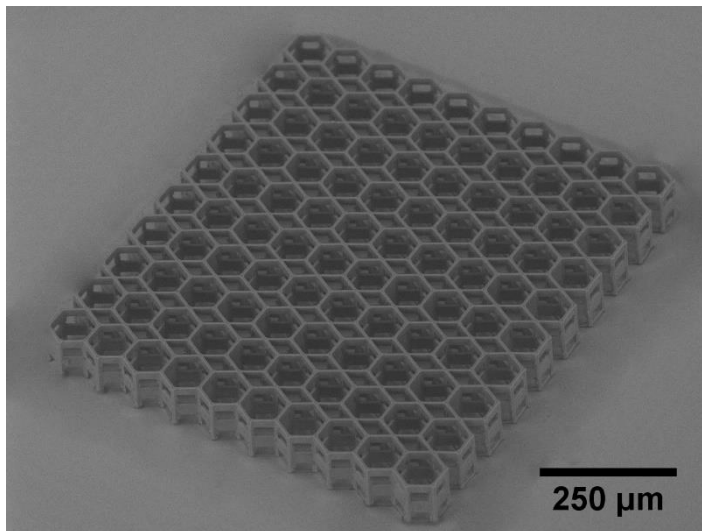
## Microoptics



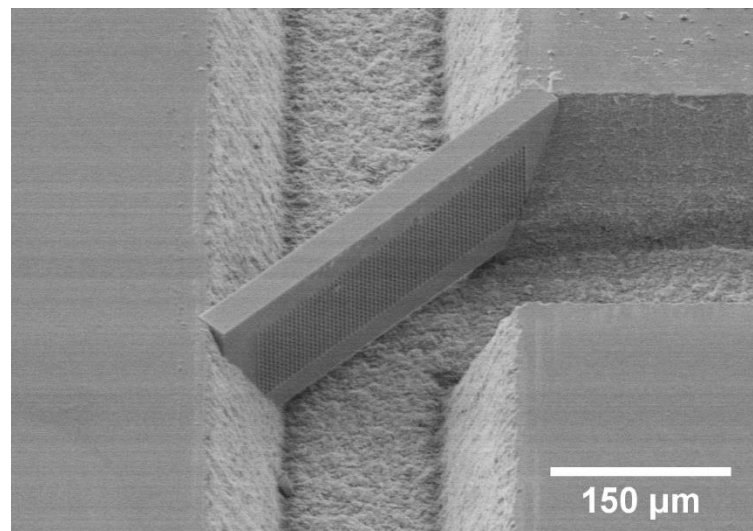
## Photonics



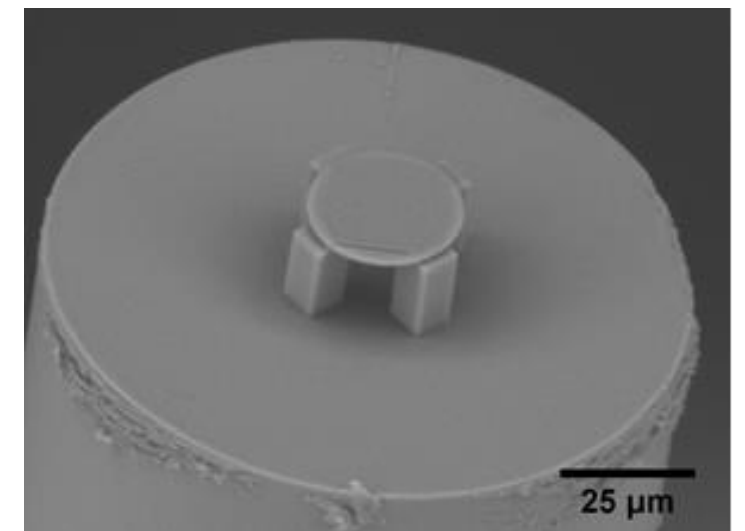
## Biomedicine



## Medical devices



## Communications





# H2020 Mesomorph



13

industrial and  
academic  
partners



5

countries



Project  
goals

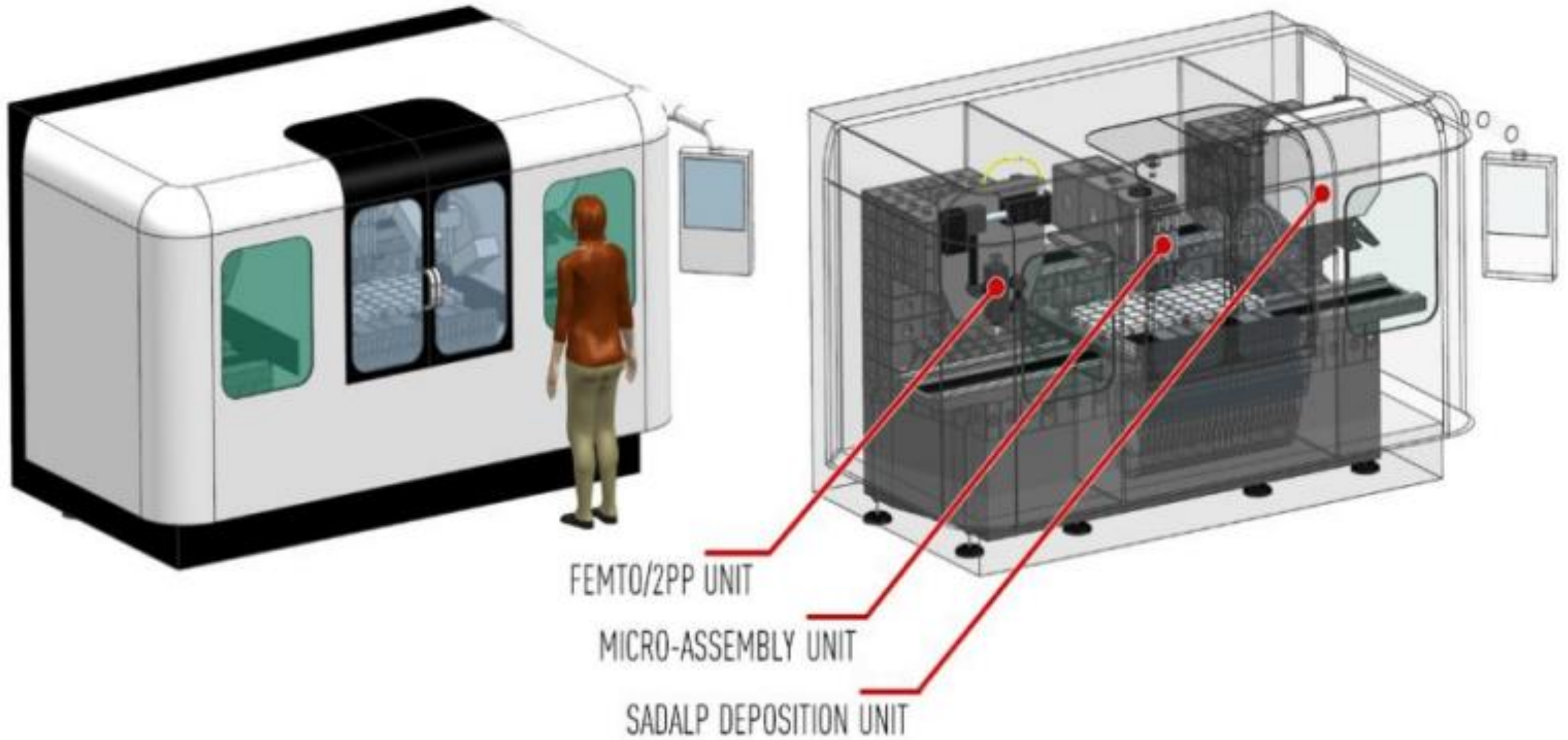
- The demonstration of an innovative scalable manufacturing concept;
- The creation of a new generation optoelectronics devices;
- The all-in-one-machine integration of nano-scale processing (i.e. atomic layer 3D nanoprining), micro scale processing (i.e. femtosecond laser subtraction/deposition and anodic bonding) and smart micromanipulation system.







# H2020 Mesomorph





**Thank You!**

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