



# Photonics at Tampere University

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29-30 March, 2023. Helsinki, Finland

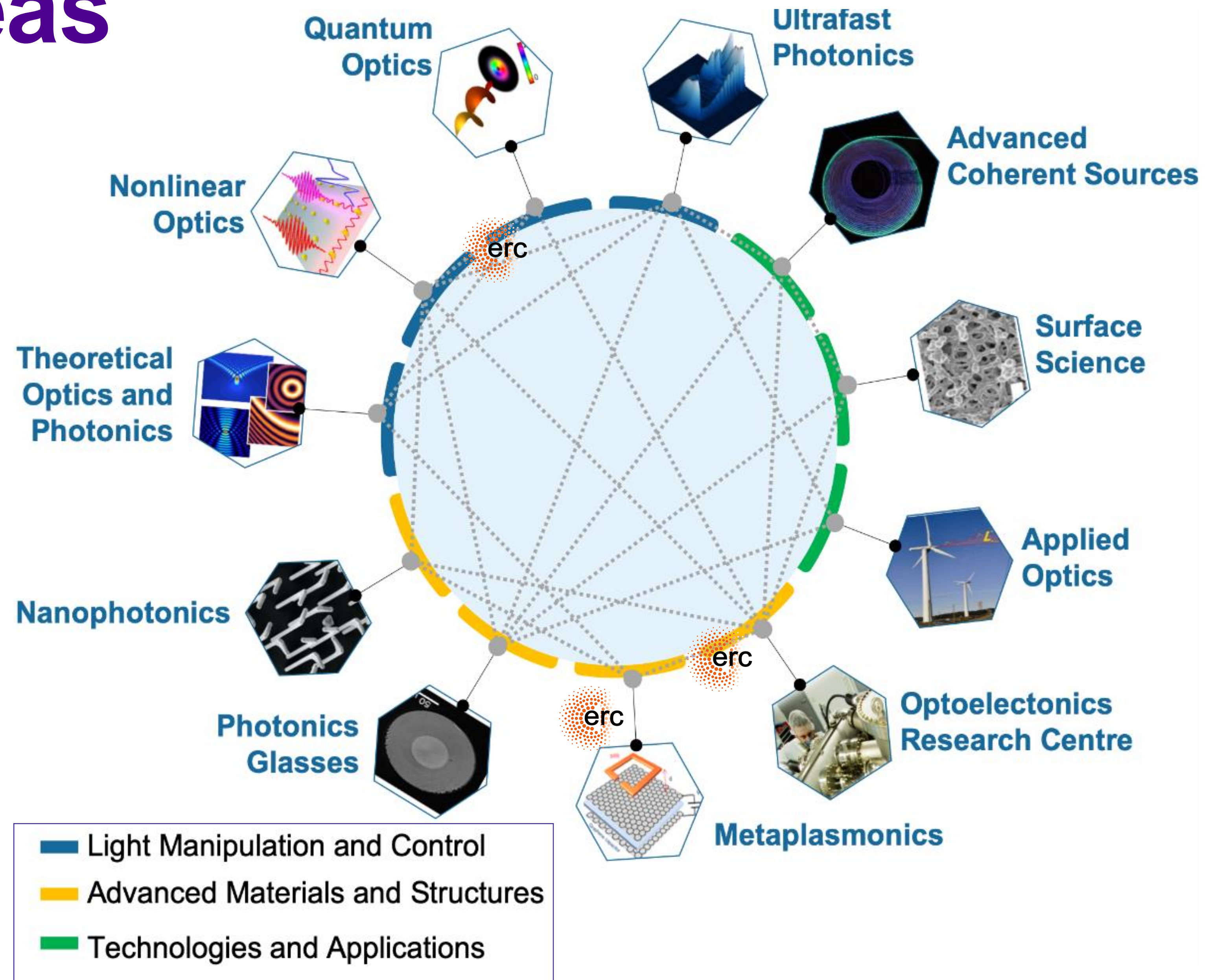


27<sup>th</sup> of March, 2023. Tampere, Finland



# Expertise areas

5 full professors  
4 tenure-track professors  
30 postdocs  
40 PhD students  
150 Total staff





# Infrastructure and national positioning in Photonics



Material epitaxy and characterization

Micro- and nanofabrication

Photonic integration

Measurement and testing

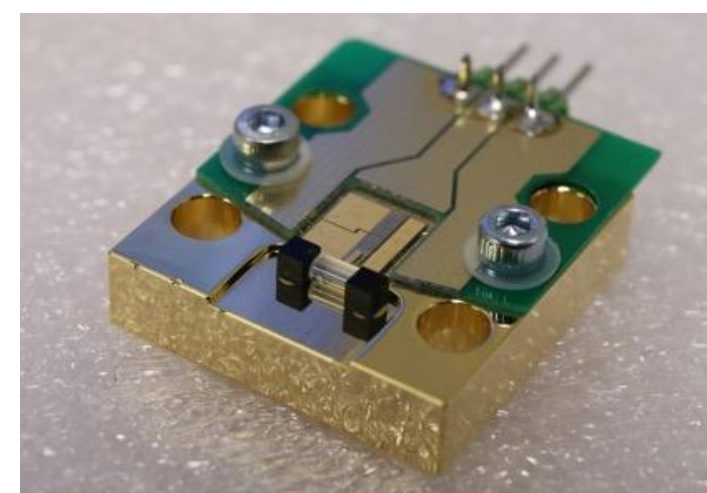
Fiber-optics

Advanced light sources

Tampere Microscopy Center

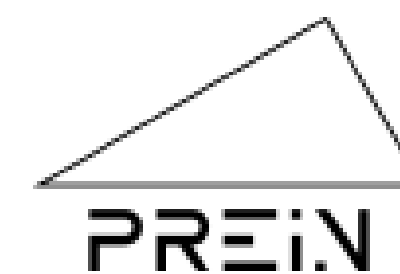
Tampere Imaging Facility

[www.prein.fi](http://www.prein.fi)

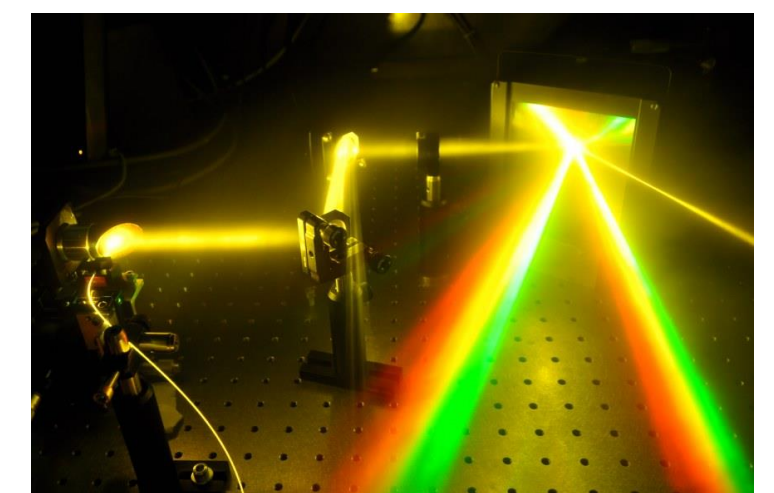
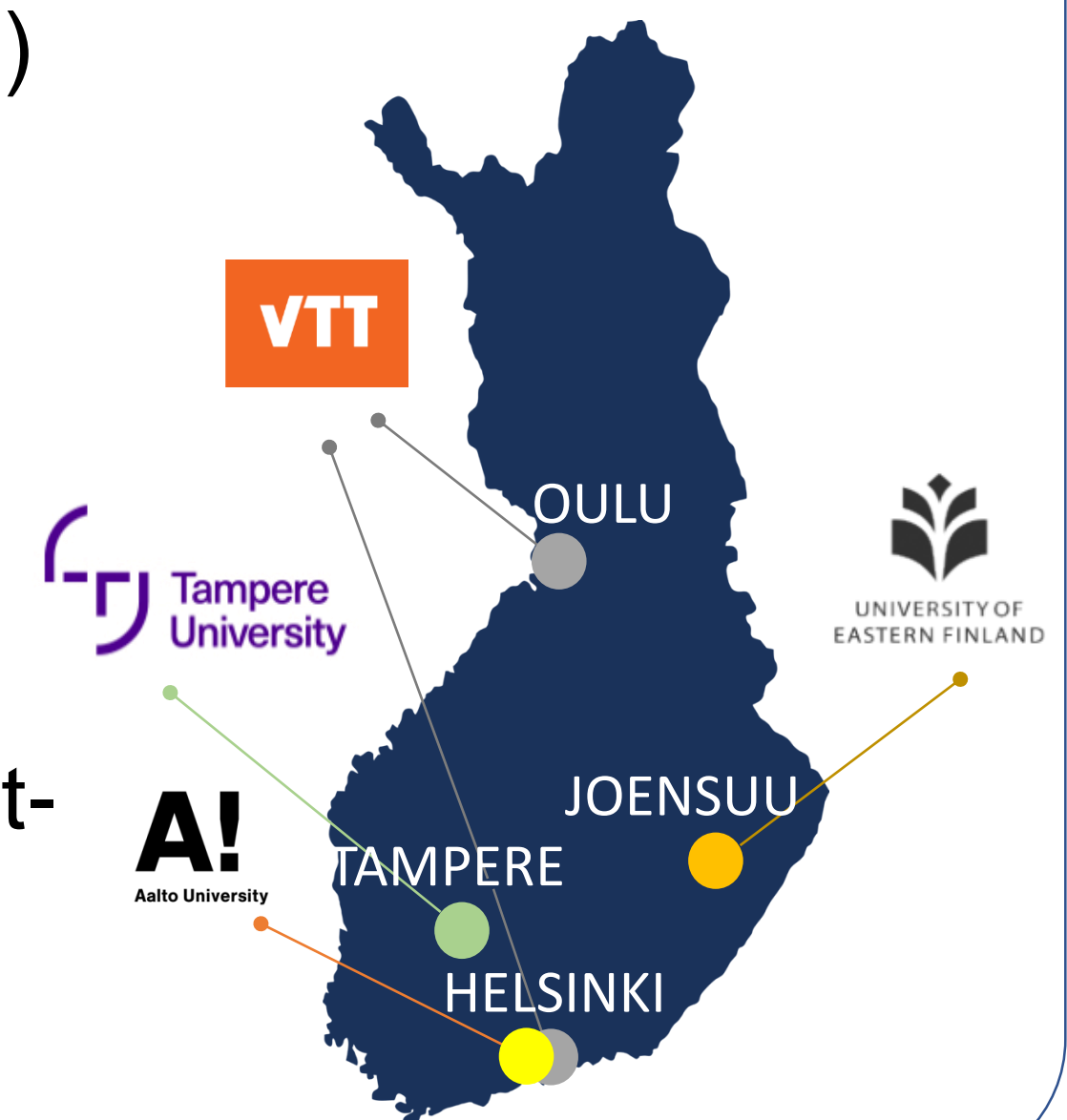


## National research and education network

Flagship for Photonics Research and Innovation (PREIN)

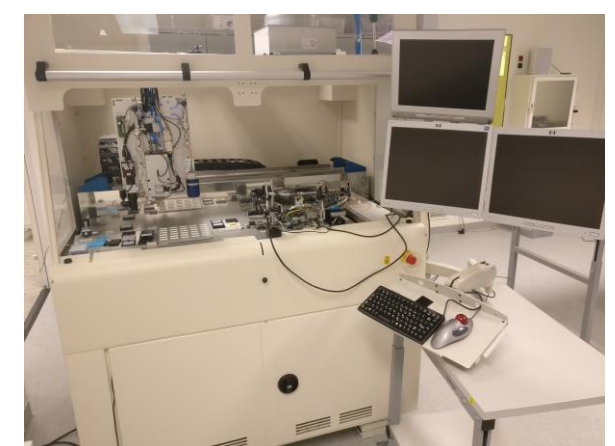


Finnish National Infrastructure for Light-based Technologies (FinnLight)

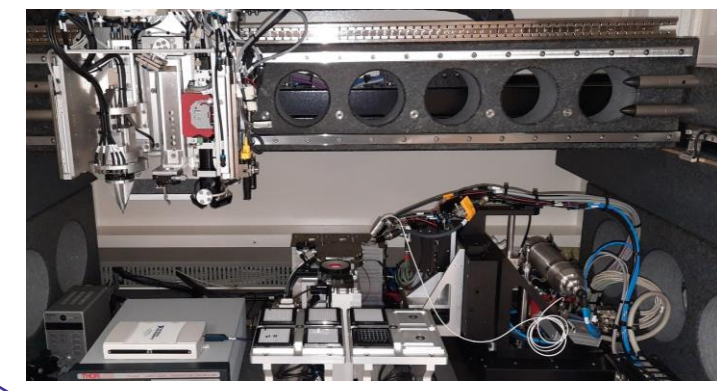




# Nano and micro-fabrication facility



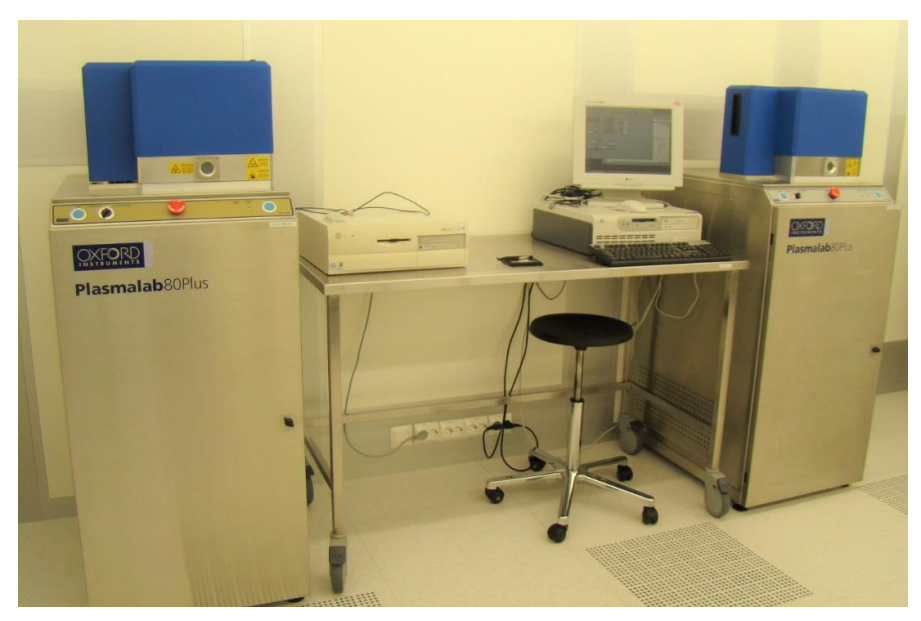
- Flip-chip bonding
- Wire bonding
- Bond validation
- Solder deposition



- 3D-micro assembly
- Optical coatings

**System level  
Customer applications**

LIDAR	Enviromental sensing
Datacom	Quantum technology
Solar energy	Biomedical technology
Imaging	Process monitoring



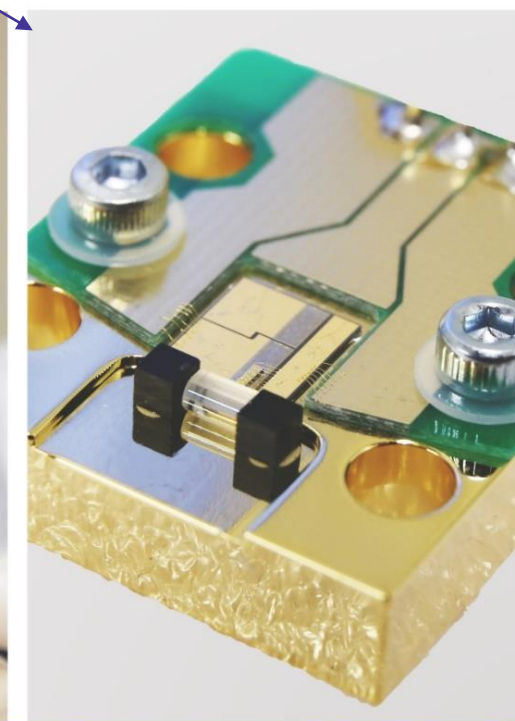
- UV Lithography
- Etching
- Metal deposit
- Insulators
- Wafer bonding
- Electron beam lithography
- Microscopy / Profilometry



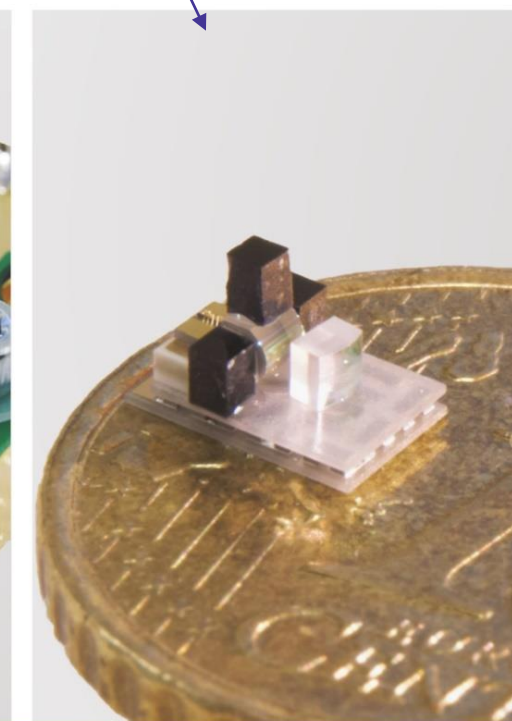
**Wafer  
fabrication**



**Wafer level  
processing  
and  
packaging**



**Chip level  
packaging**



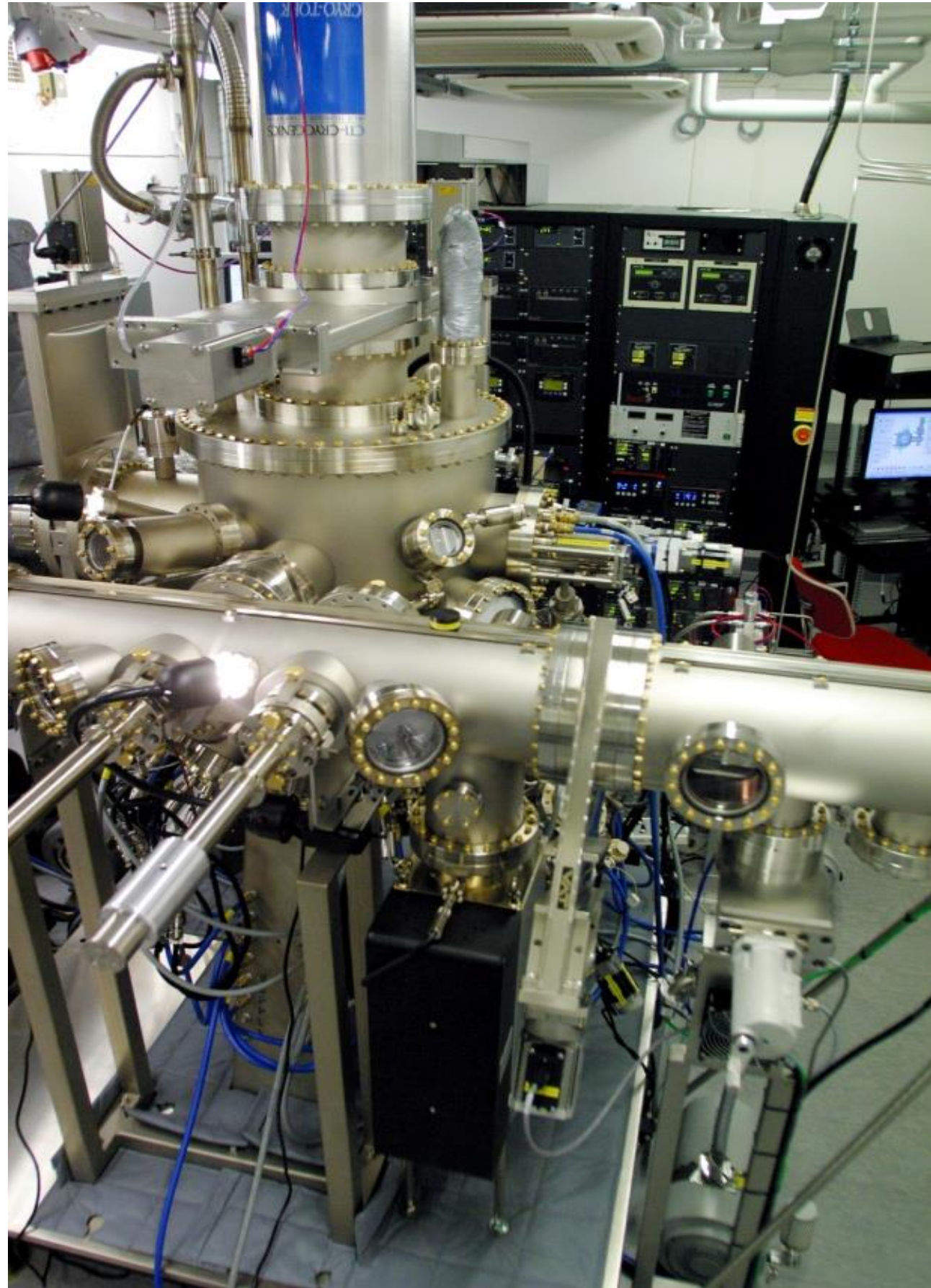
**Module  
sub-assembly**

[www.research.tuni.fi/orc](http://www.research.tuni.fi/orc)

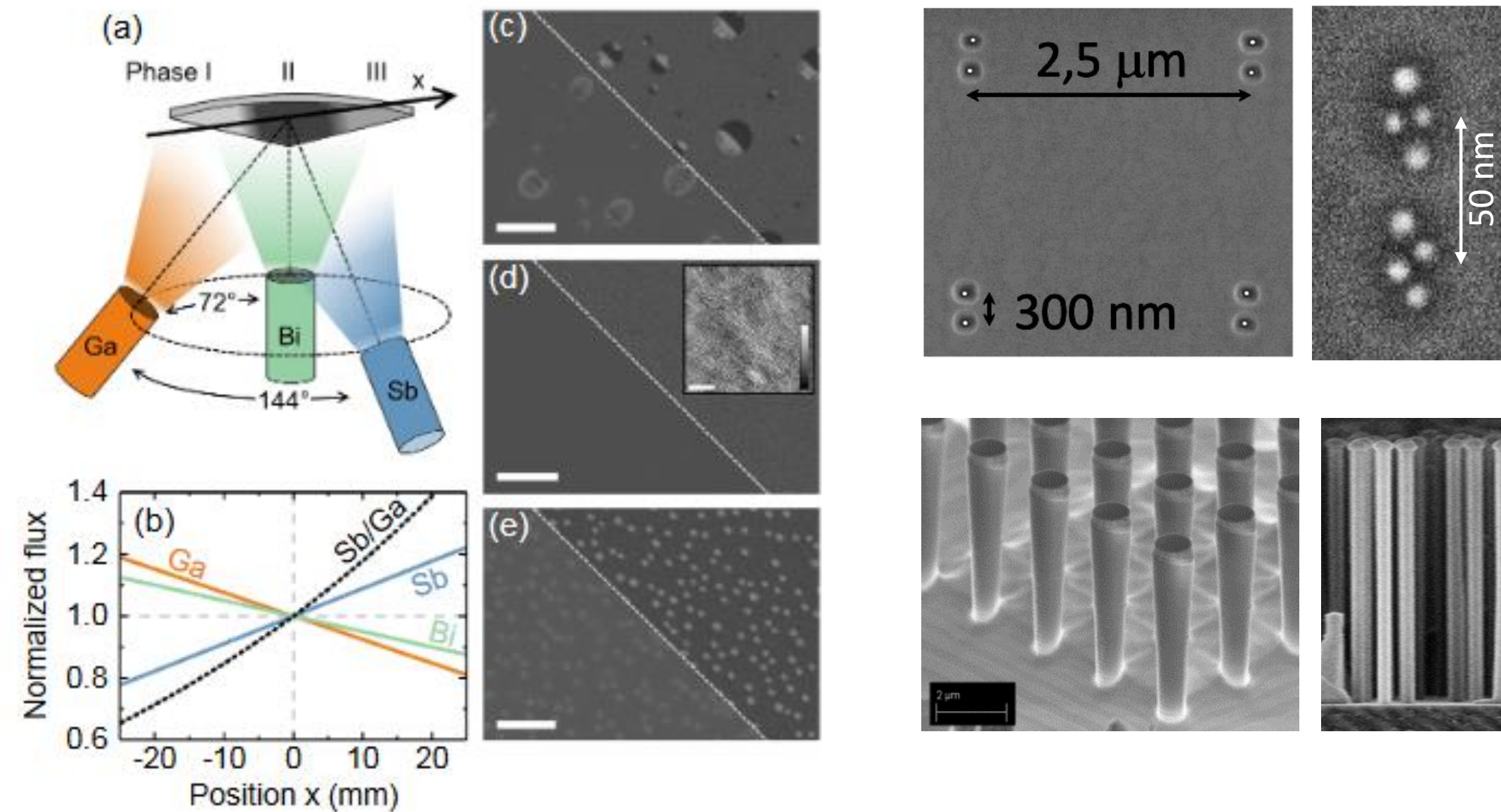
**External  
chip fabs**



# Core technology: Molecular Beam Epitaxy



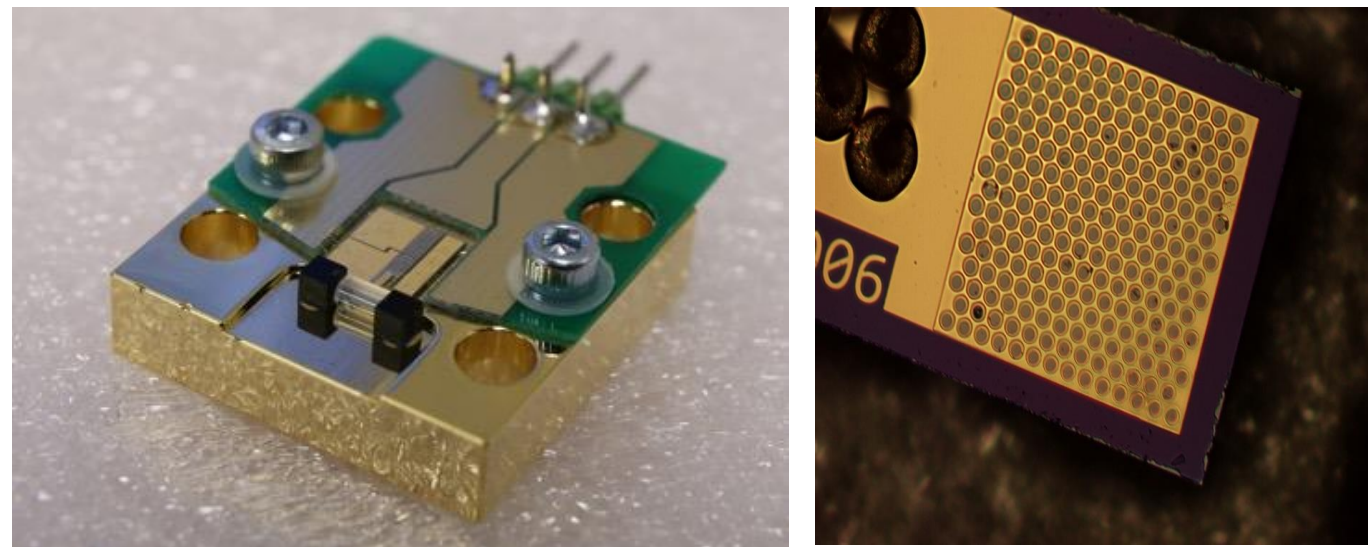
- 4 MBE systems for epitaxy of **InP**, **GaAs**, and **GaSb**-based compounds
- Covering **600 nm to 3  $\mu\text{m}$**



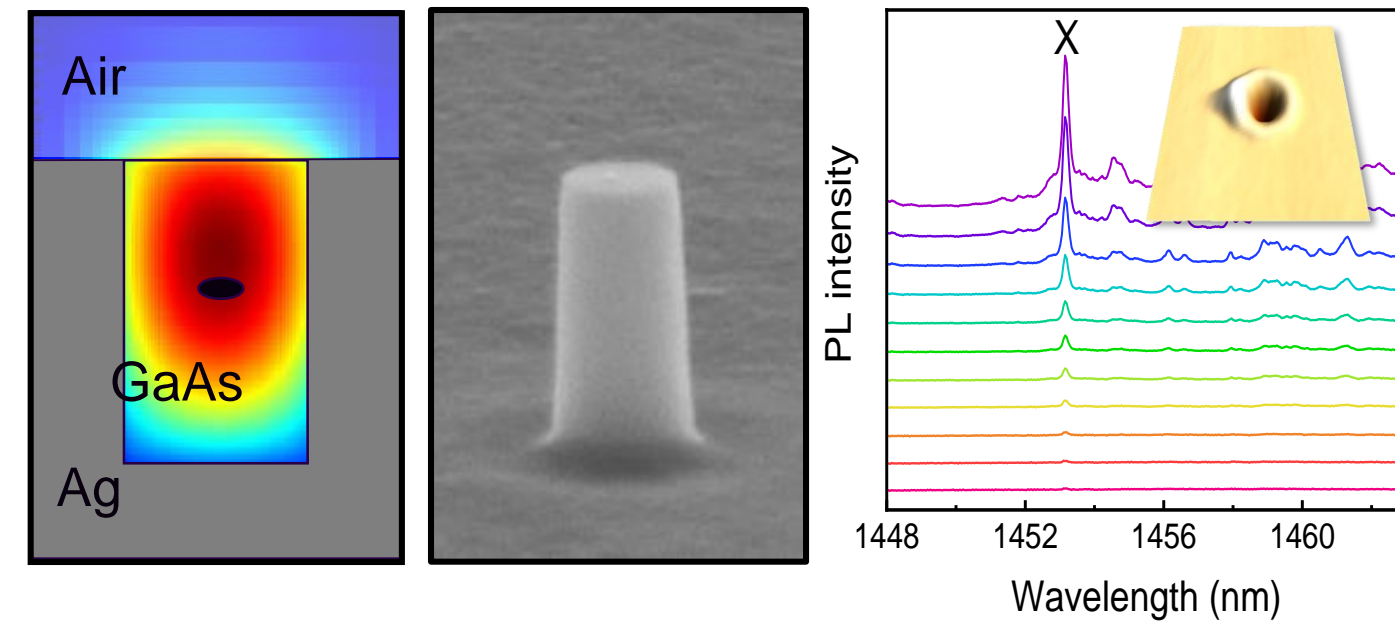


# Research on optoelectronic devices

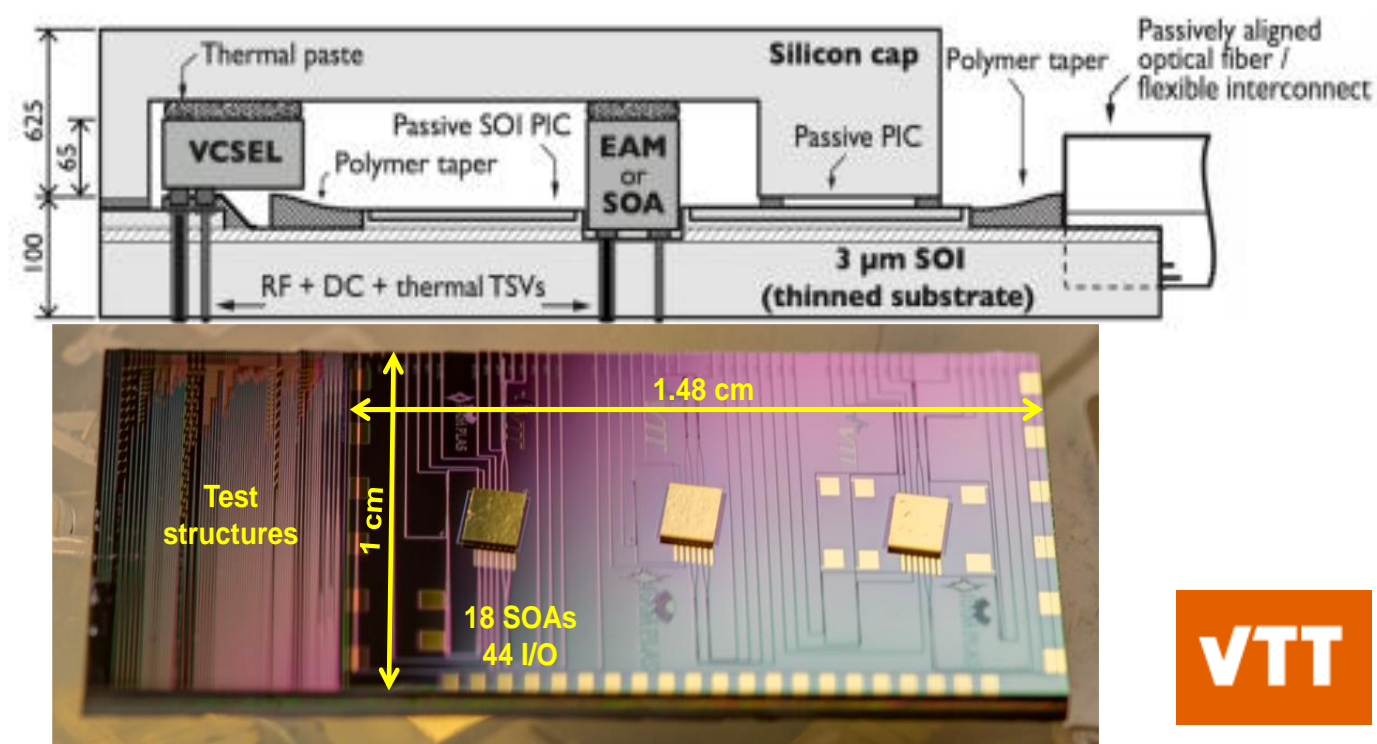
**DFB/DBR laser diodes and SLEDs, VCSEL arrays**



**Non-classical light sources and cryogenic optoelectronics**

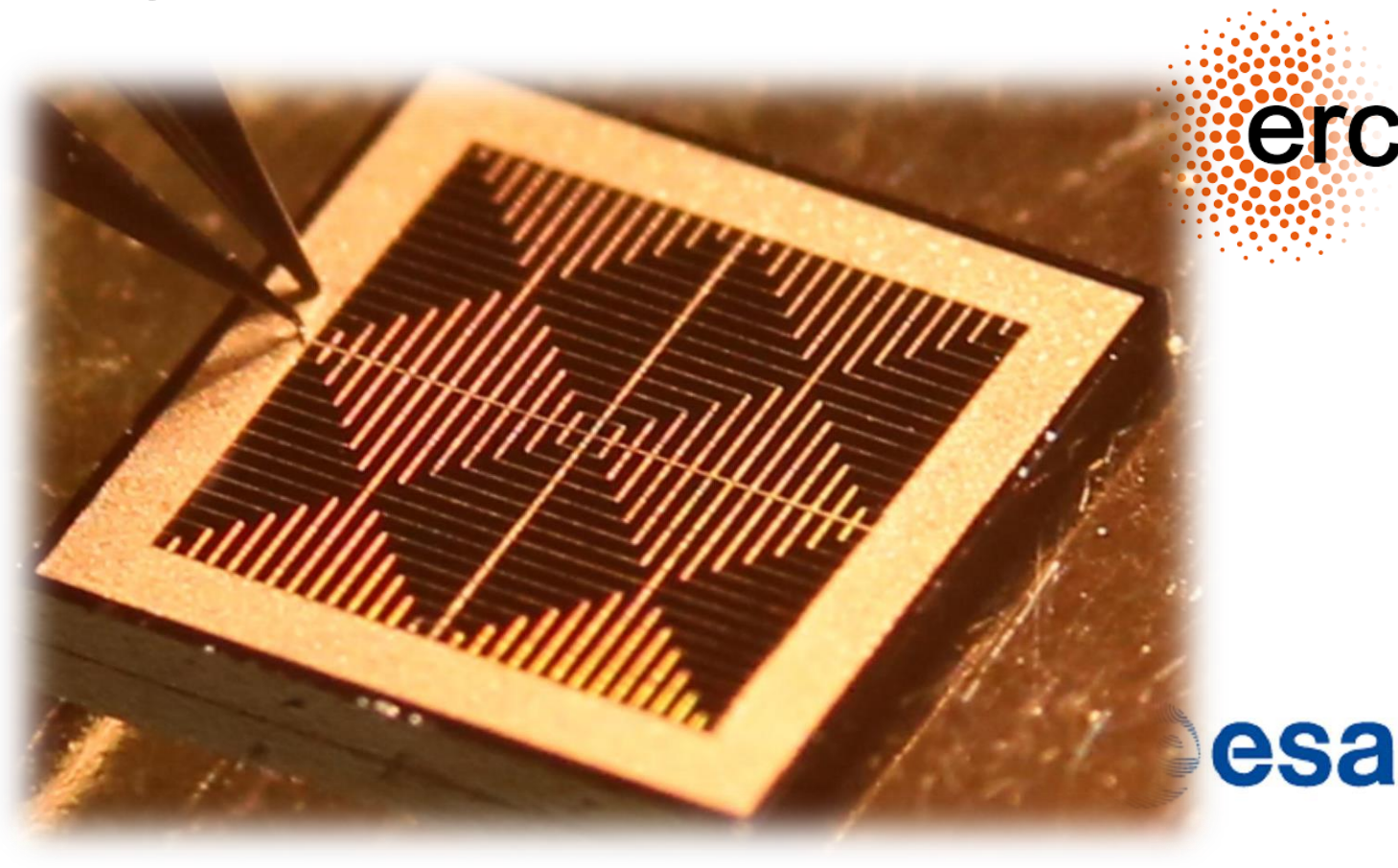


**Photonic integrated circuits (PICs)**



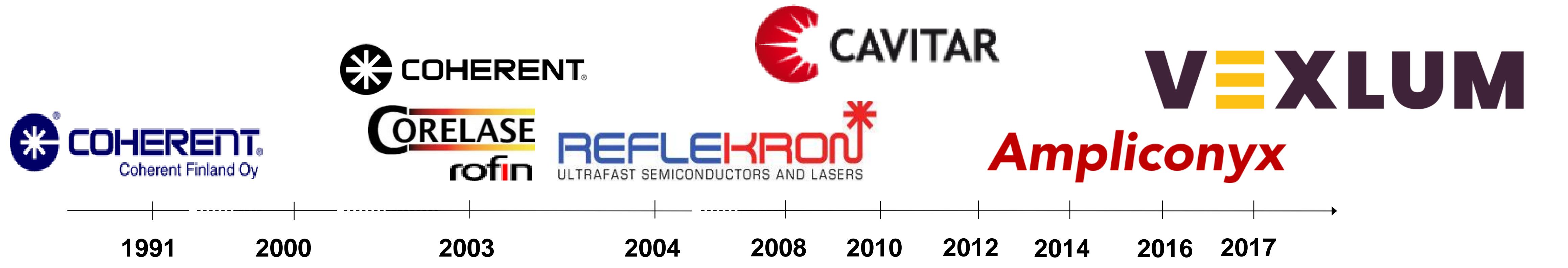
VTT

**High efficiency GaInNAsSb solar cells**





# The birthplace of Tampere “laser valley”



modulight

\* PICO PHOTONICS

Q-switched  $\mu$ -chip lasers for time-gated Raman spectroscopy, range finding, LIDAR, and microscopy.