Photonic Boards: Opportunities and Challenges of Electro-Optical Co-Engineering

Dr. Nikolaus Flöry, vario-optics ag

November 15th, Munich

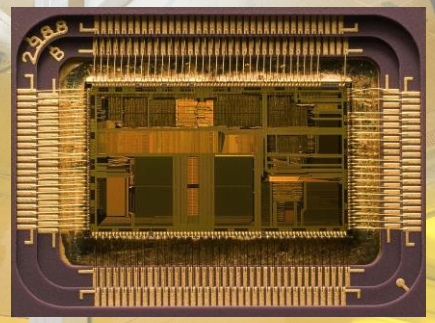
Who we are

- SME based in Heiden, Switzerland
- Spin-off from Varioprint AG (PCB)
- Designer & Manufacturer of photonic boards
- Applications & Markets:
  - Photonic Sensing (Medical, Industrial, Environmental)
  - High-speed on-board communication (Telecom, Aerospace)
  - Photonic chip packaging (Telecom, Sensing,…)

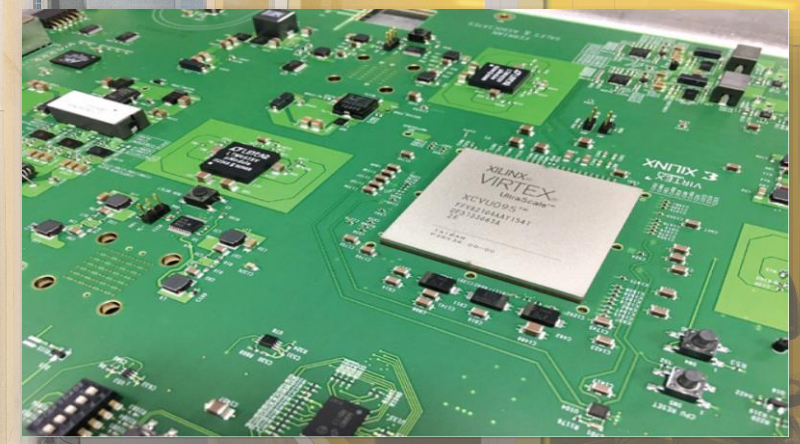
Photonic Boards?

Electronics

Chip level

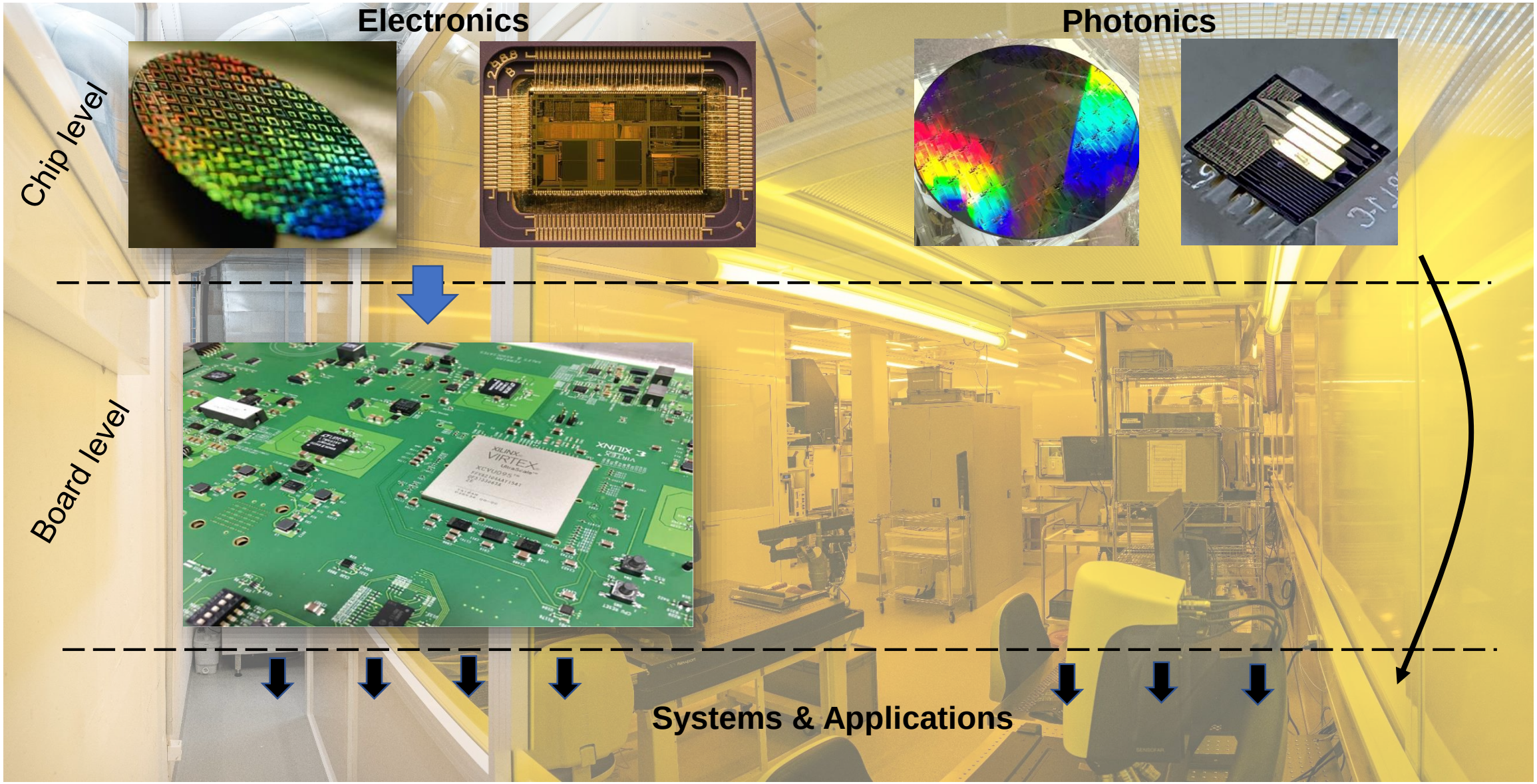


Board level



Systems & Applications

Photonic Boards?

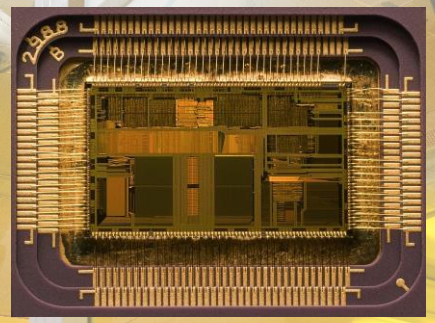


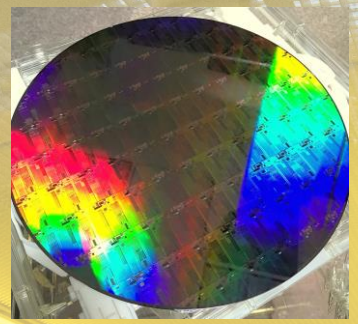
Photonic Boards?

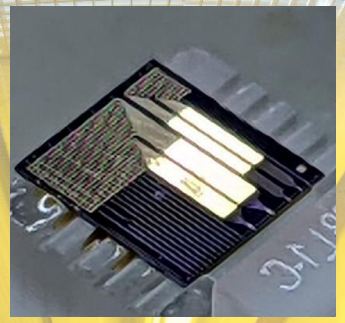
Electronics

Photonics

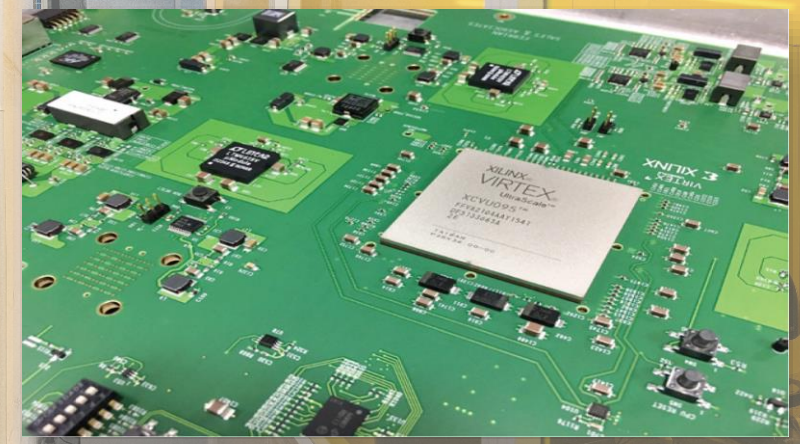
Chip level

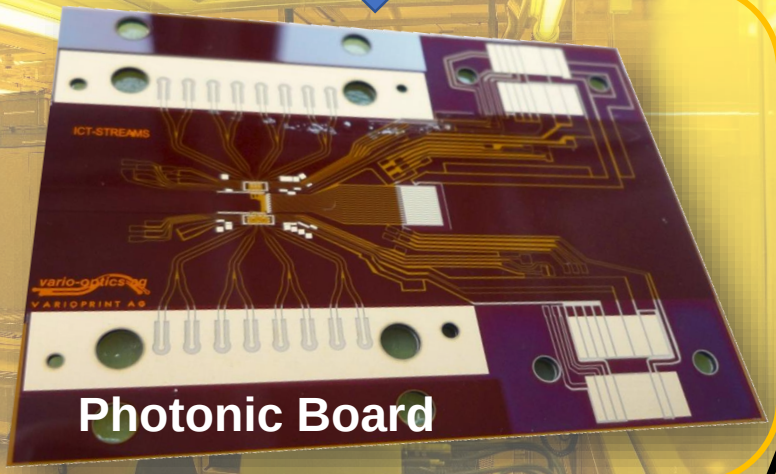






Board level

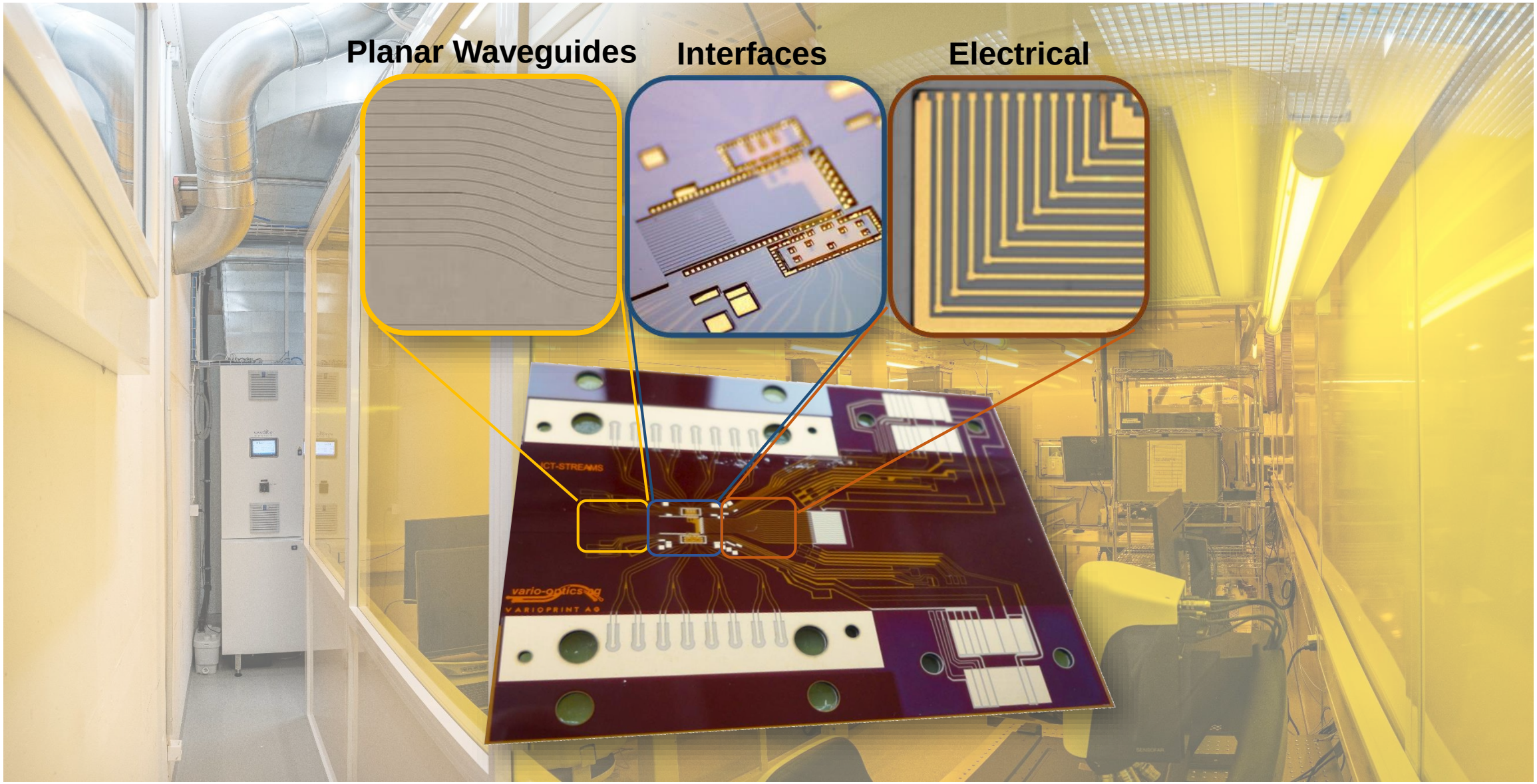




Photonic Board

Systems & Applications

Photonic Boards



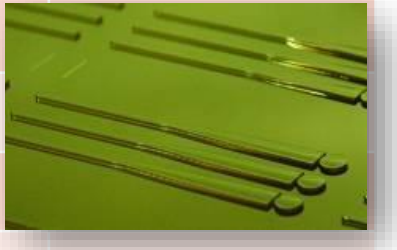
vario-optics Waveguide Technology Portfolio

> 15 years of Waveguide R&D Know-How

Process / Technology

Polymer

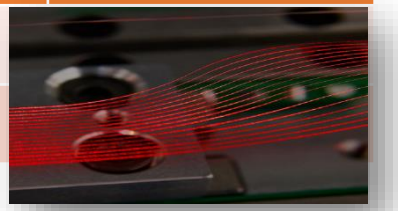
Multimode	30 – 500 µm
• 500 µm	
• 250 µm	
• 50 µm	



Singlemode	2 – 8 µm
• 3 µm	
• 5 µm	

Glass

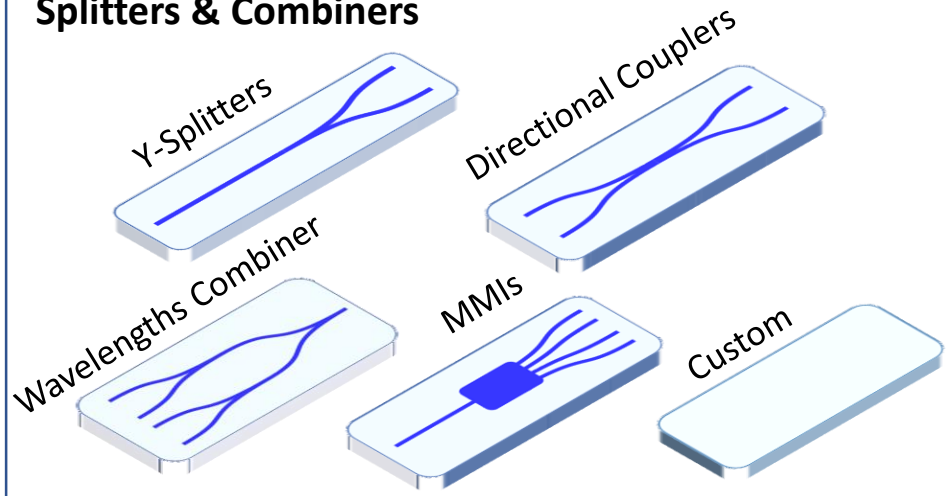
Singlemode	
~ 5 µm	



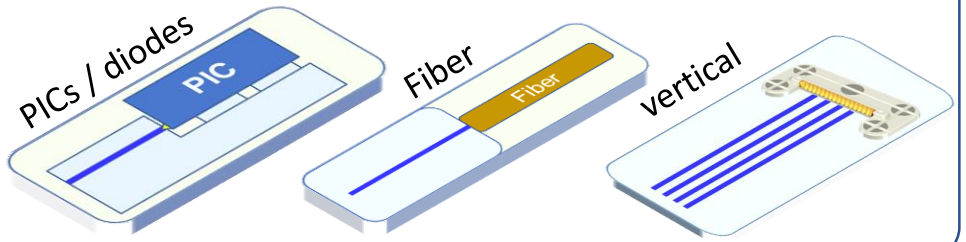
Functionality

Modefield / NA Adjustment

Splitters & Combiners



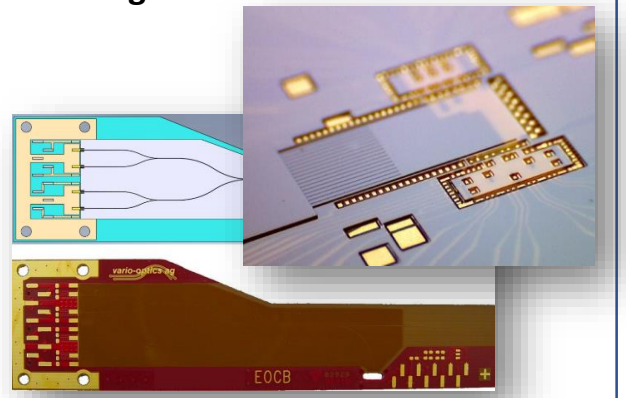
Connectivity



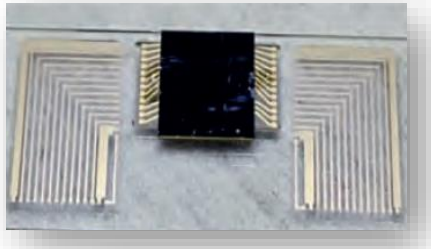
Integration & Assembly

Optical | Electrical | Mechanical

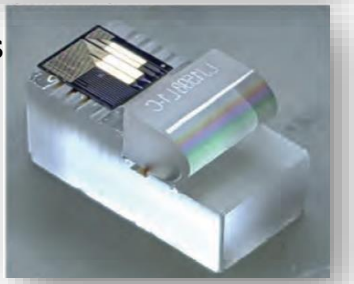
PCB Integration



Glass Interposer

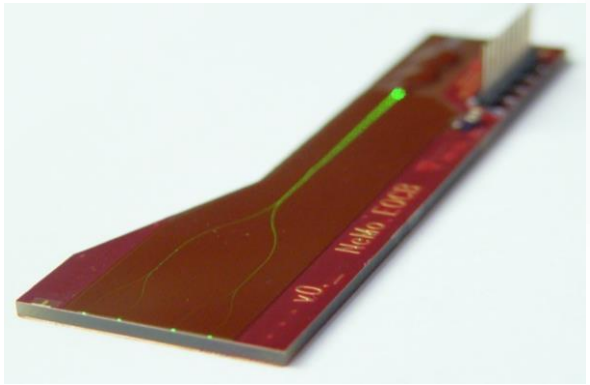


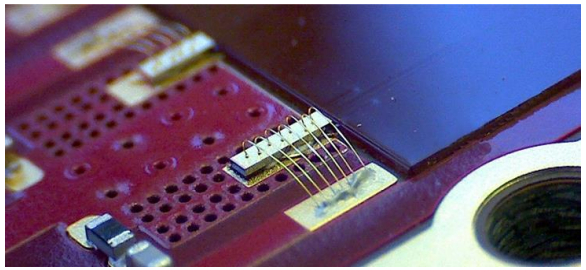
Free-Space optics

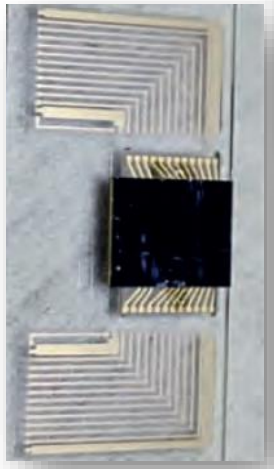


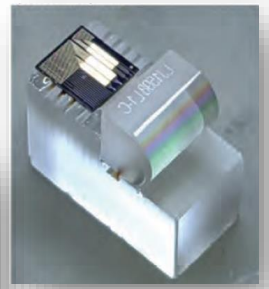
Why electro-optical co-engineering?

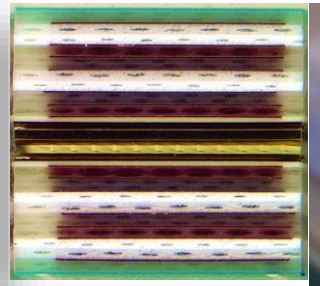
(+mechanical
+ thermal)

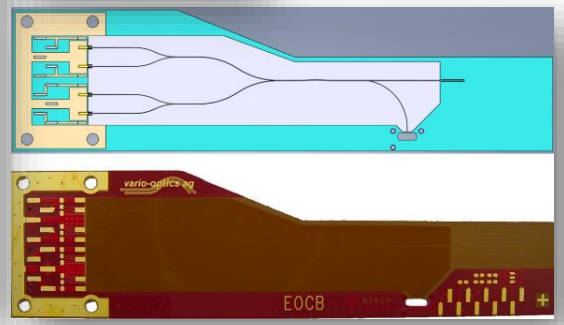


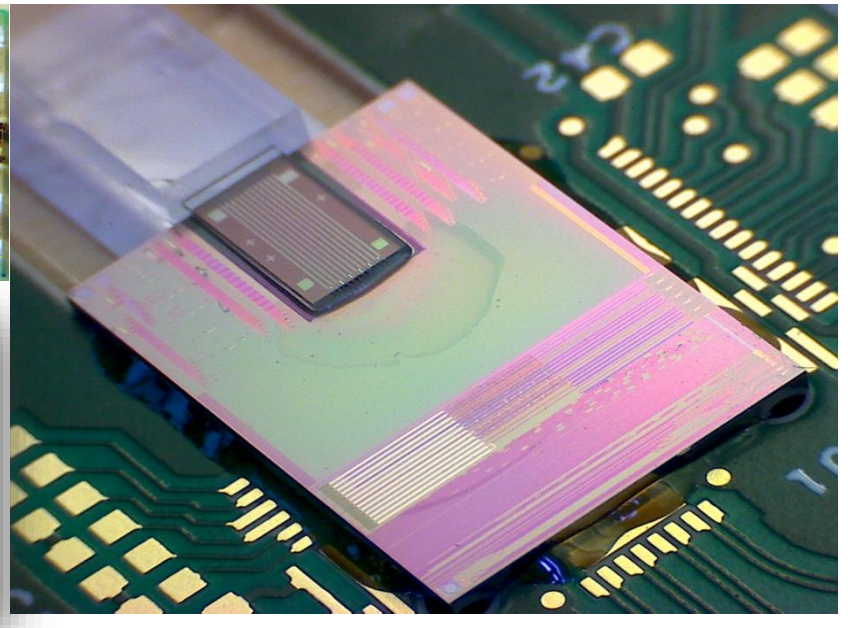


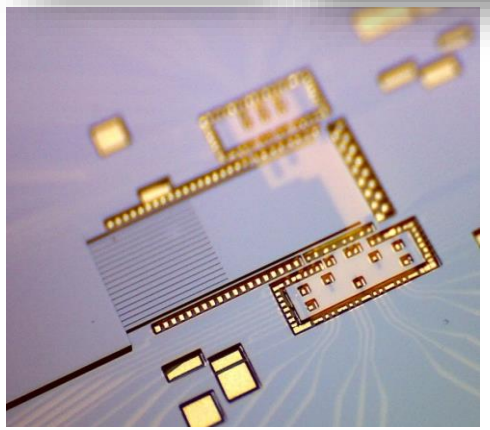


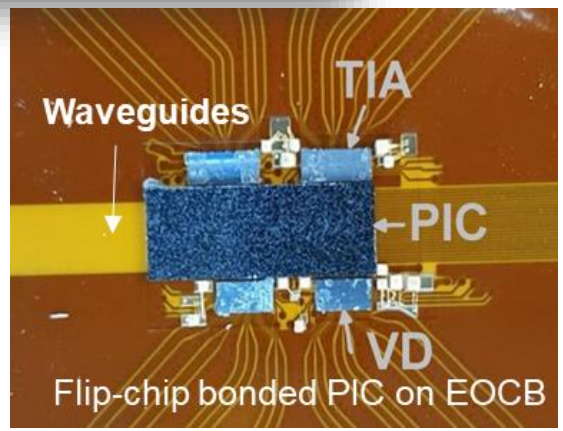


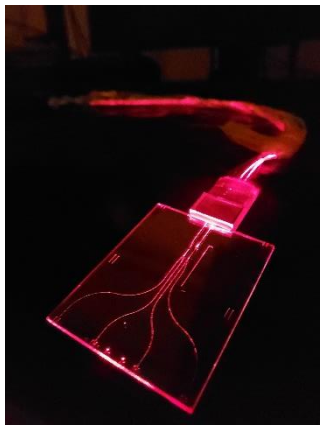




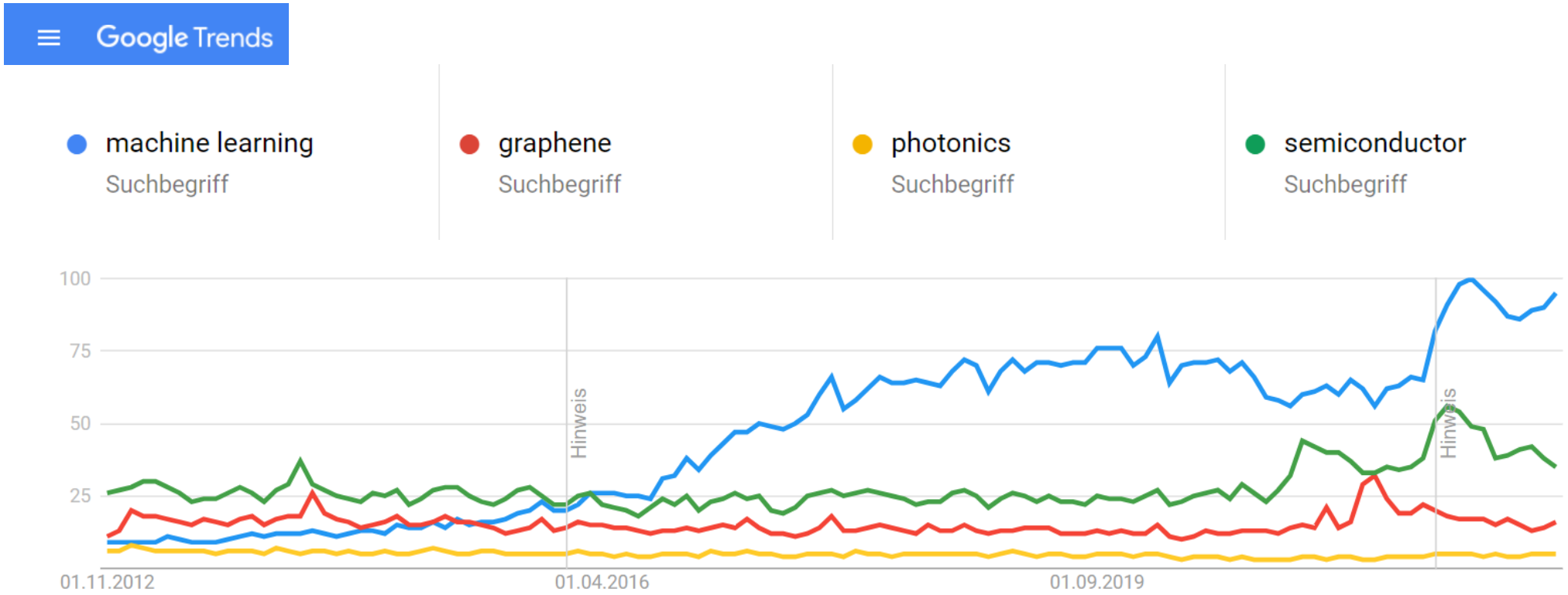








Lesson 1: «Photonics» is not known well



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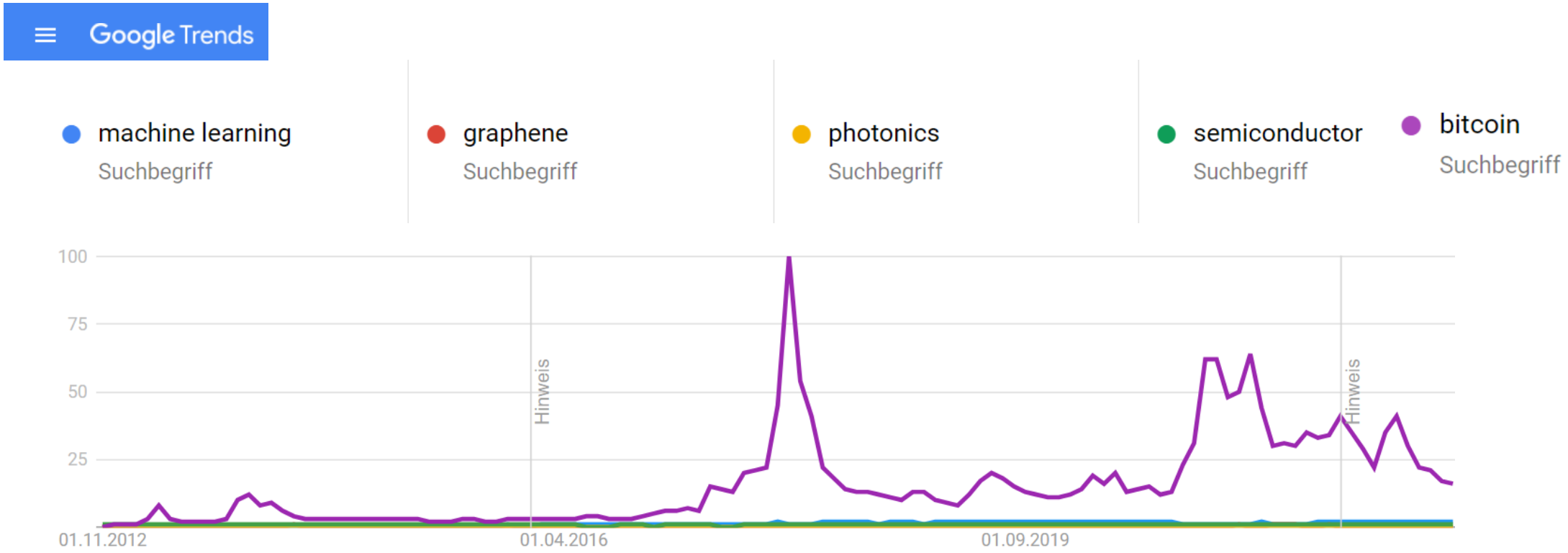
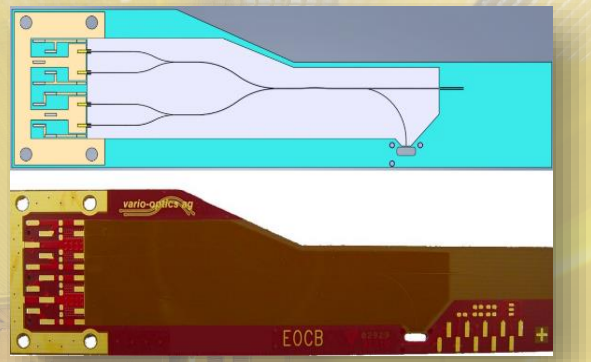


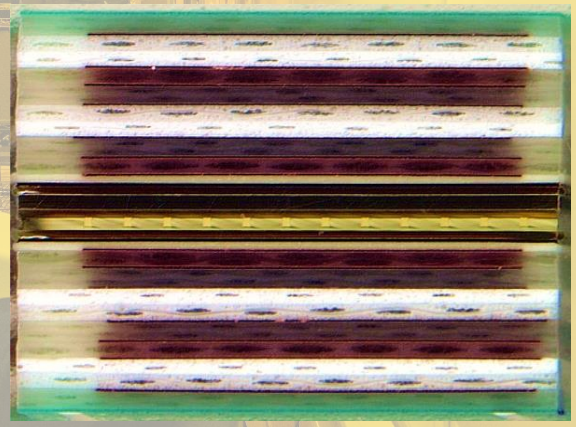
Lesson 1: «Photonics» is not known well

- People, even (especially) engineers like to stay in their field
- High-entry barrier for new technologies

Lesson 2: Co-Engineering

- Common: serial workflow
- Photonic integration needs communication on all levels
  (design, simulation, but also manufacturing and especially assembly/Integration)
- Even better: co-engineering!



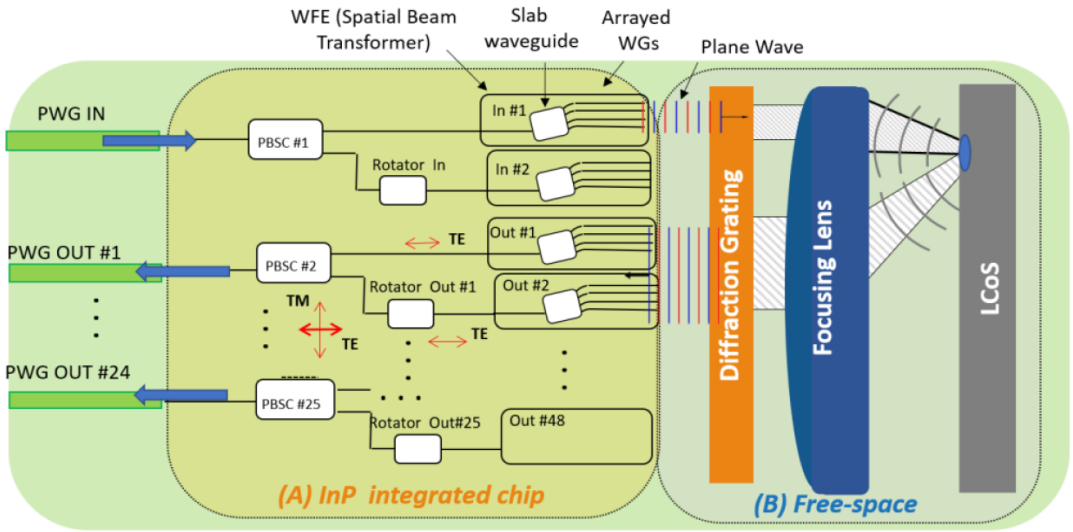


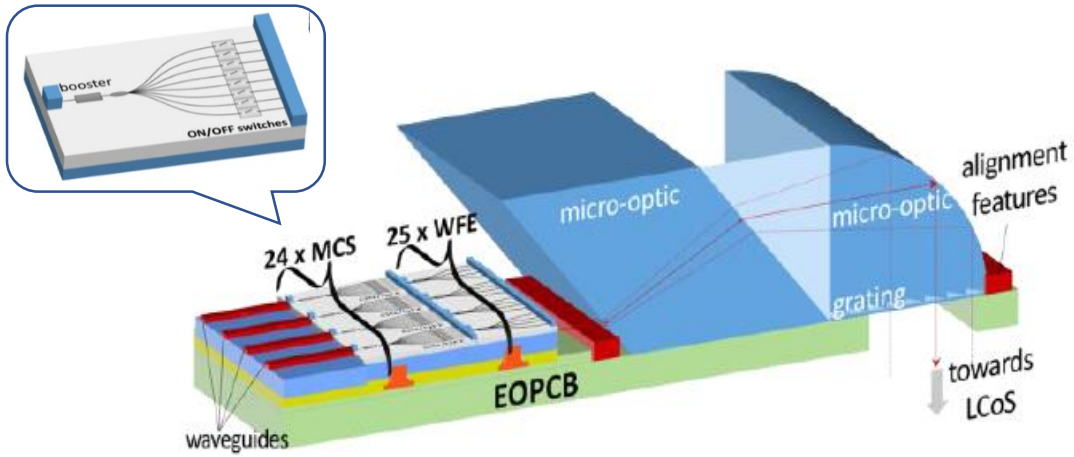
Example: ICT-QAMeleon

Reconfigurable Optical Add/Drop Multiplexer (ROADM)

www.ict-qameleon.eu

Hybrid InP-LCoS 1x24 WSS





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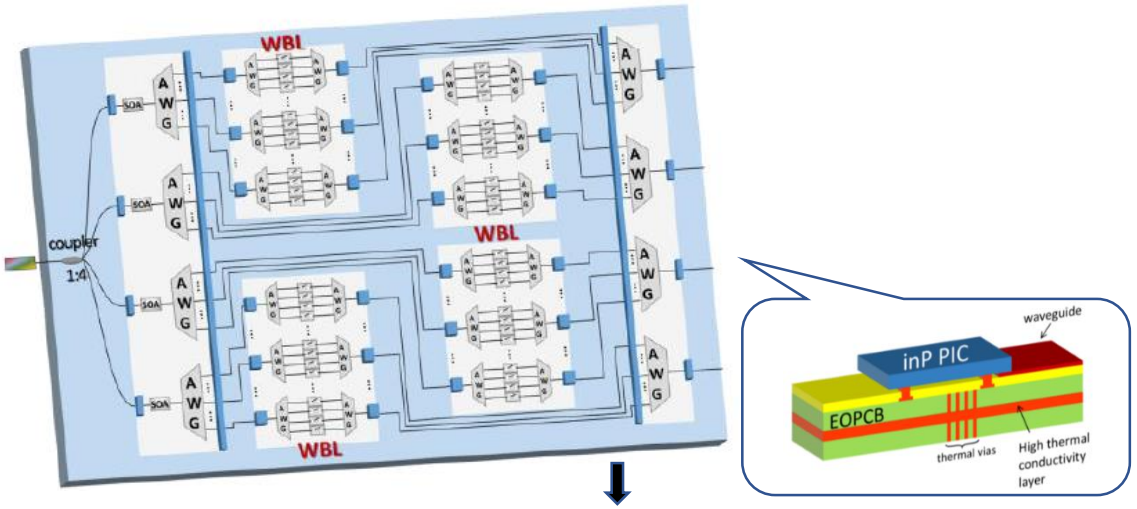
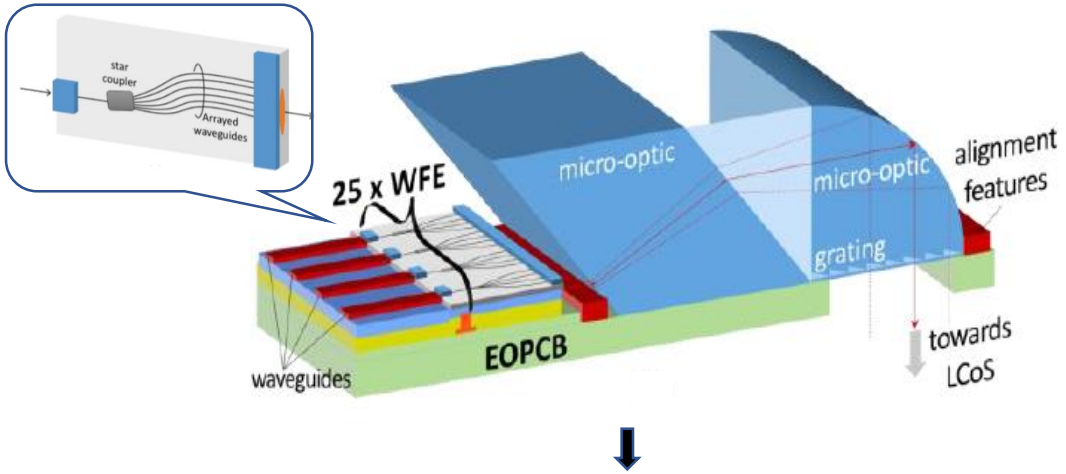
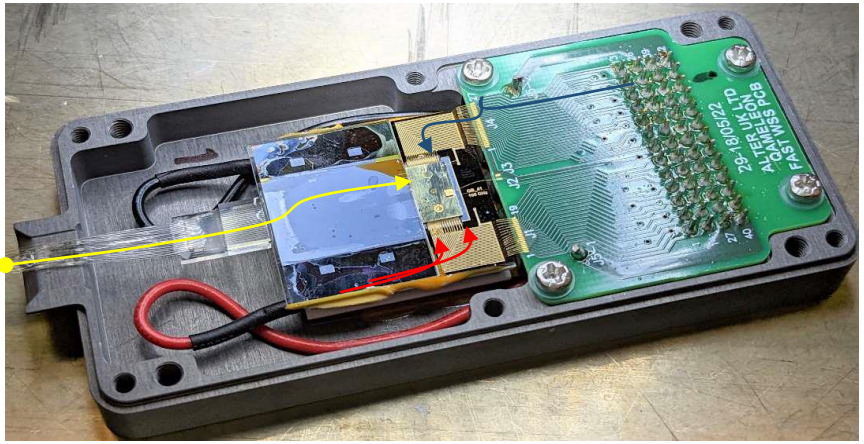
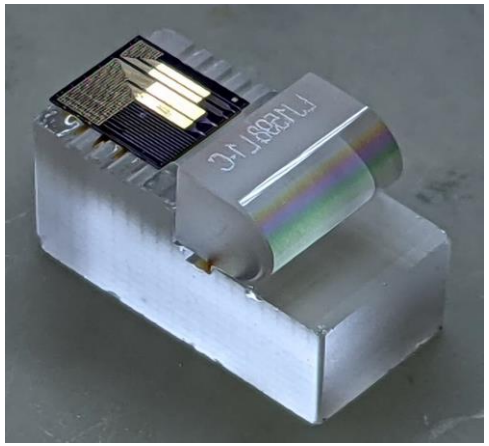




Optical
Electrical
Mechanical
Thermal





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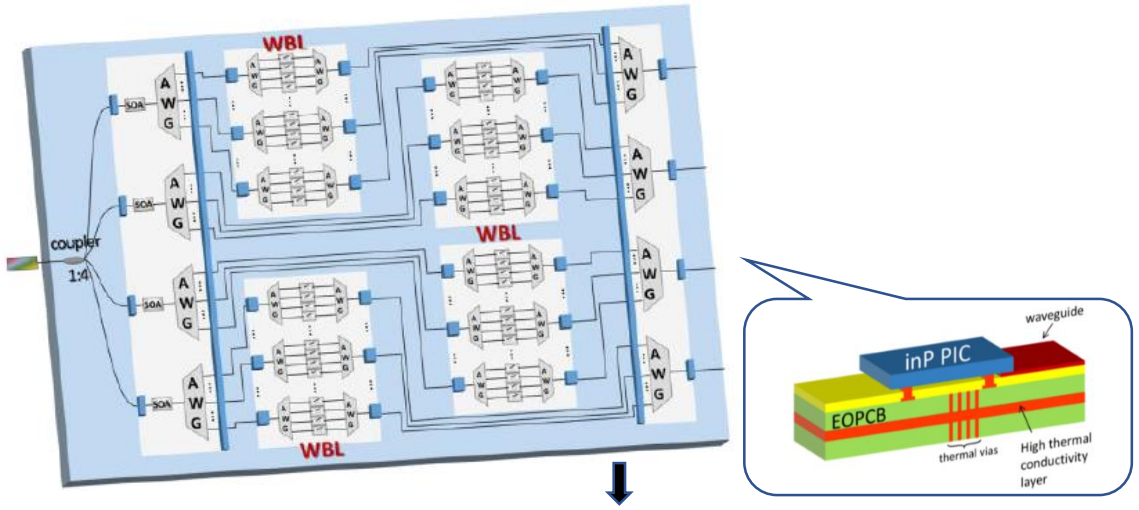
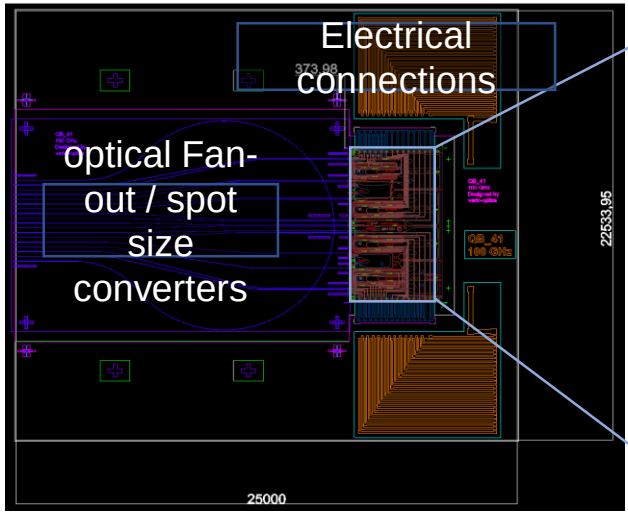
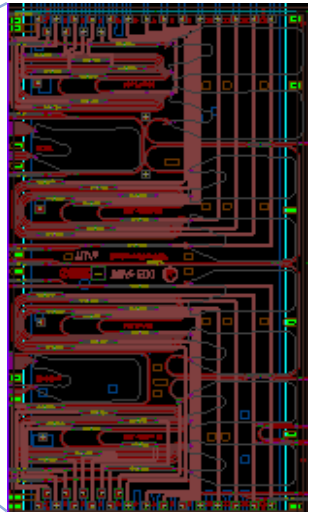


Electro-optical interposer (vario-optics)



InP Chip



Optical
Electrical
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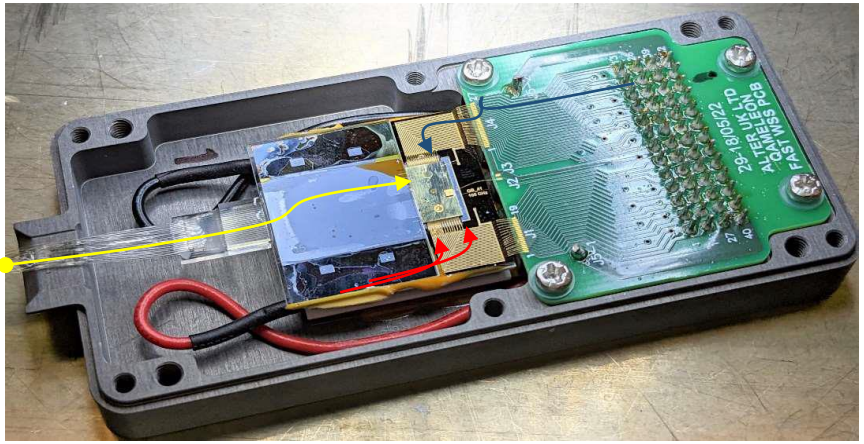
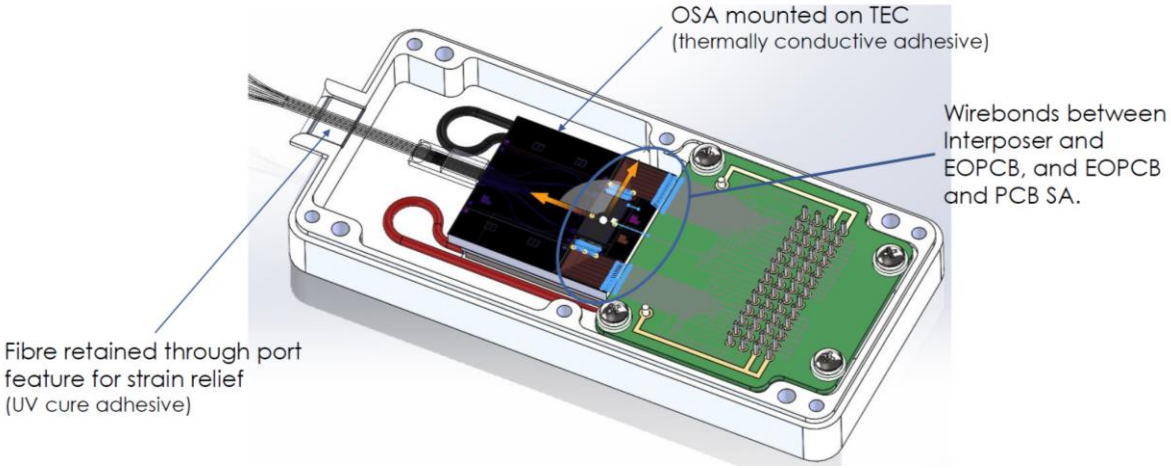
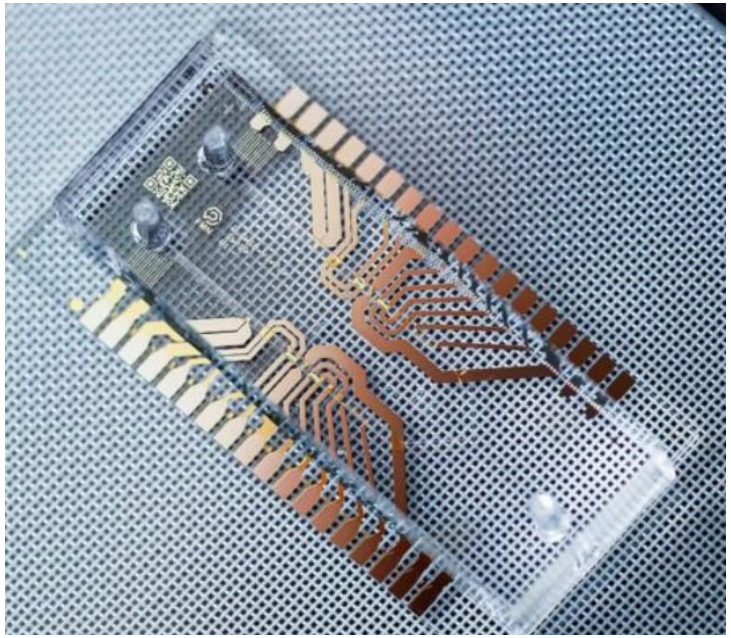
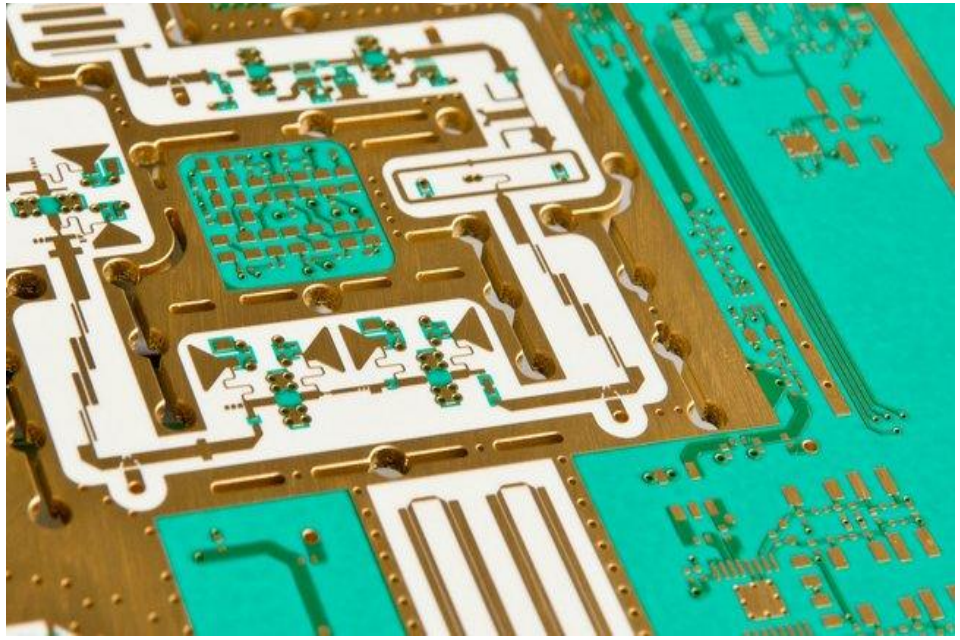
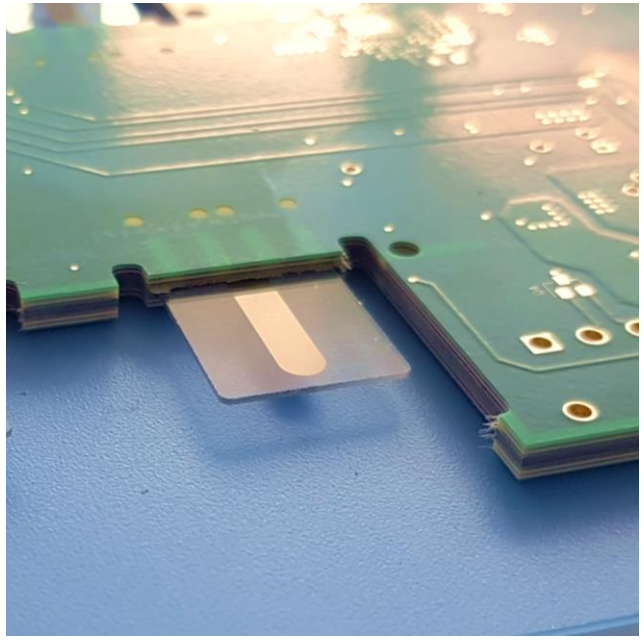


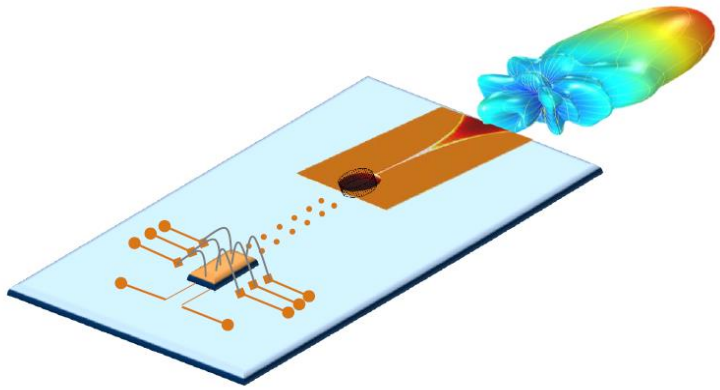


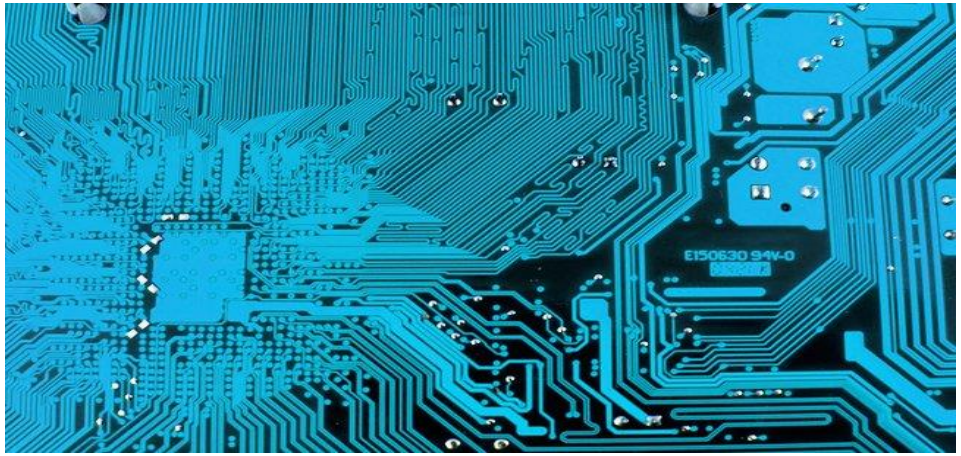
Lesson 3: There are many things in common!

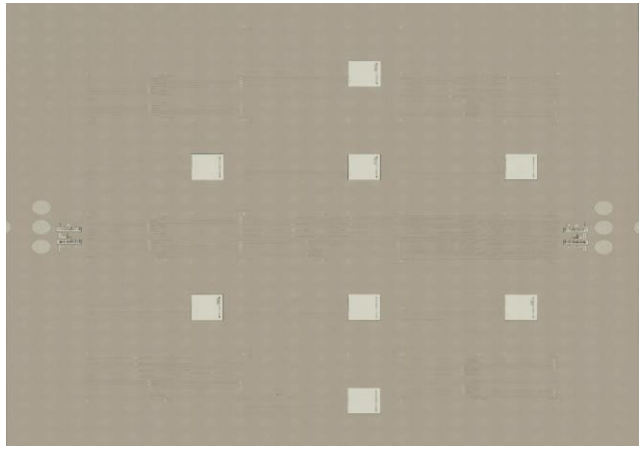






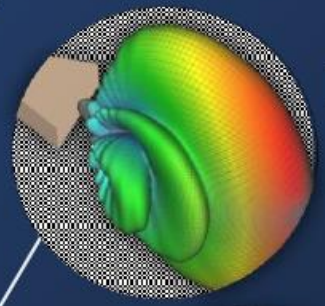




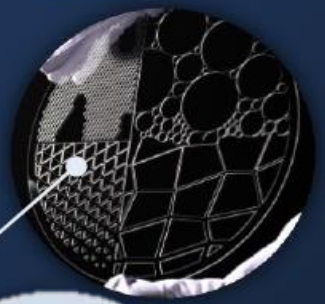


Example: Glass

Electronics **Photonics**



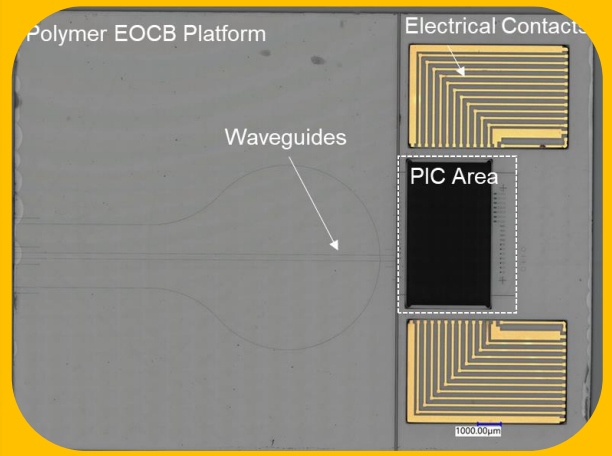
Electro-Magnetic / RF



Mechanical

Metallization

Substrate for Waveguides

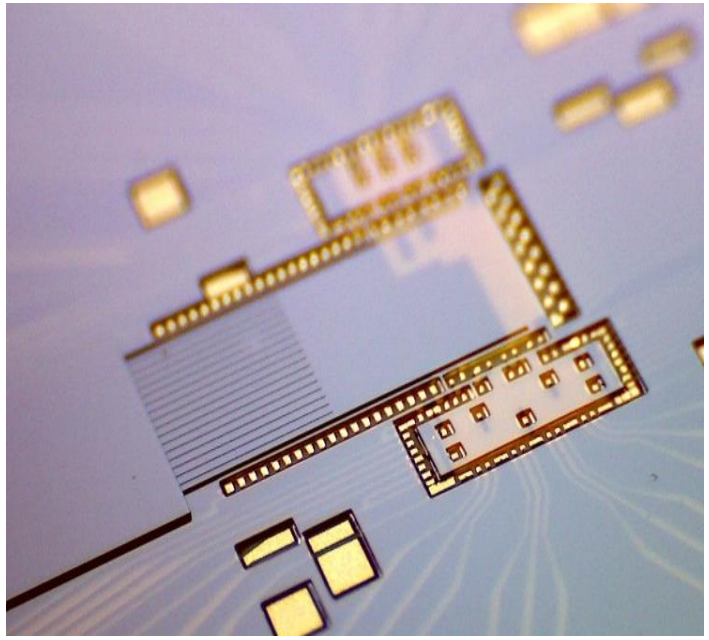


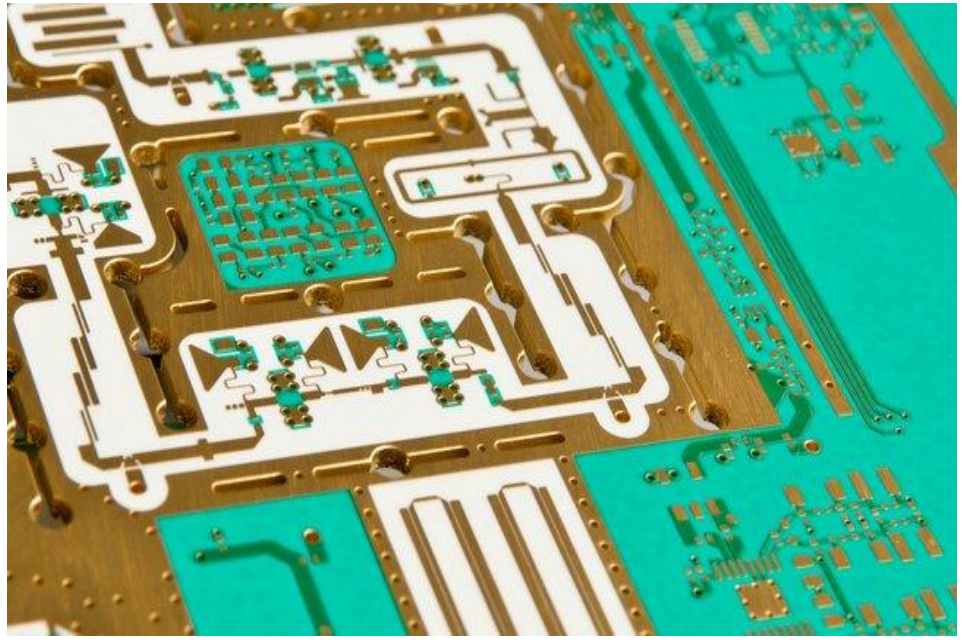
PCB Integration

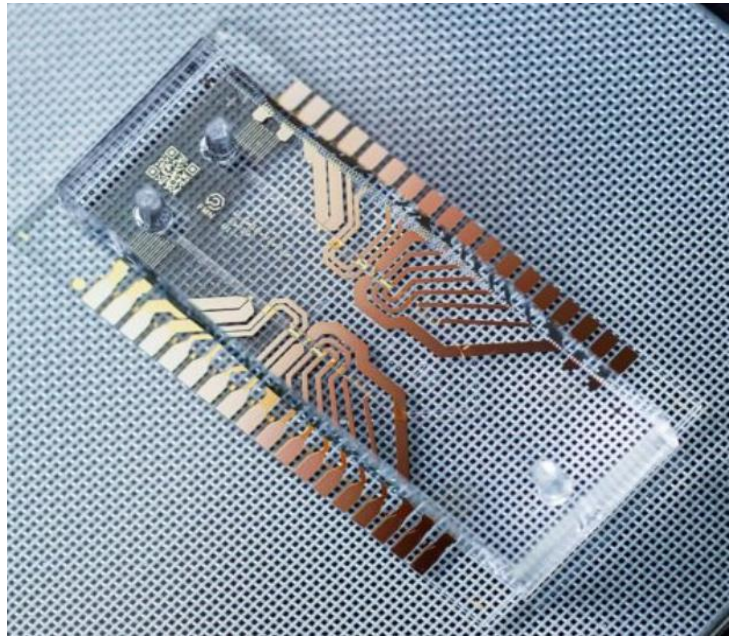
Optical waveguides in glass

In collaboration with Fraunhofer IZM VARIOPRINT AG

Lesson 3: There are many things in common!







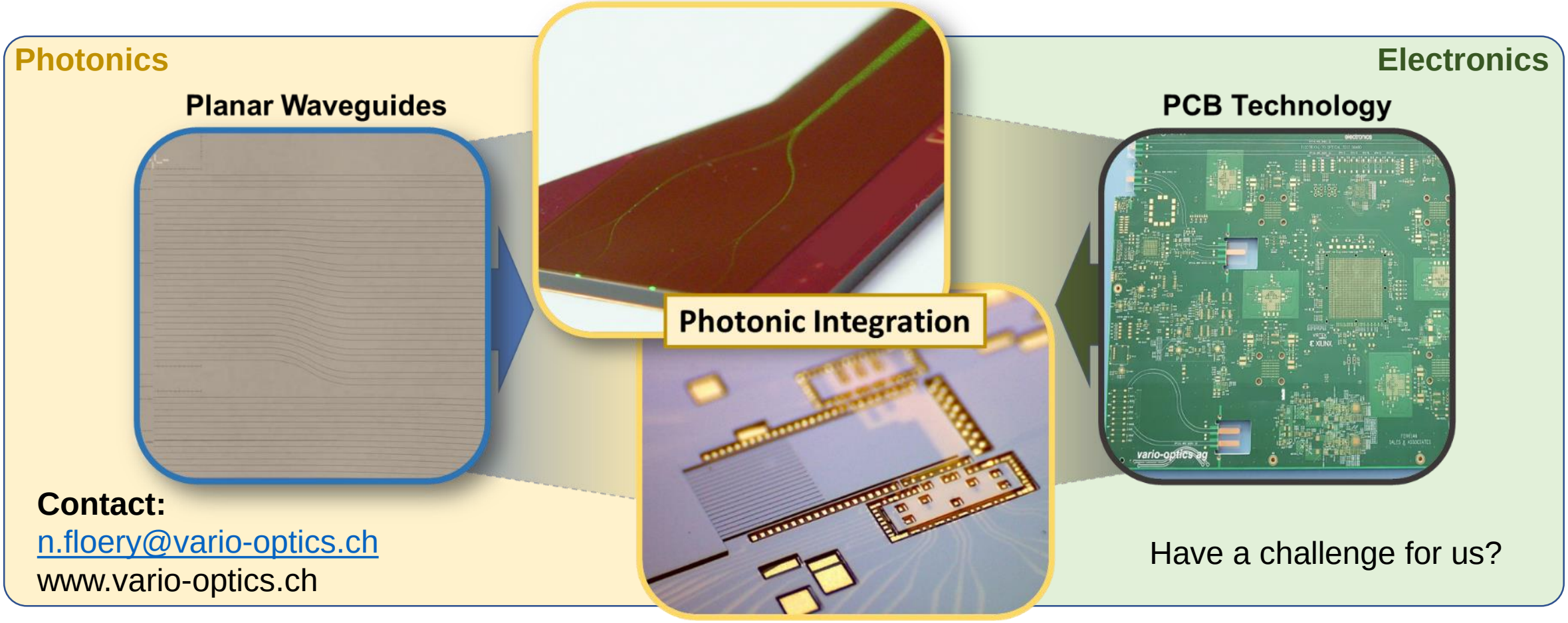
Mechanical Precision for Integration

High-Speed RF Boards to drive PICs

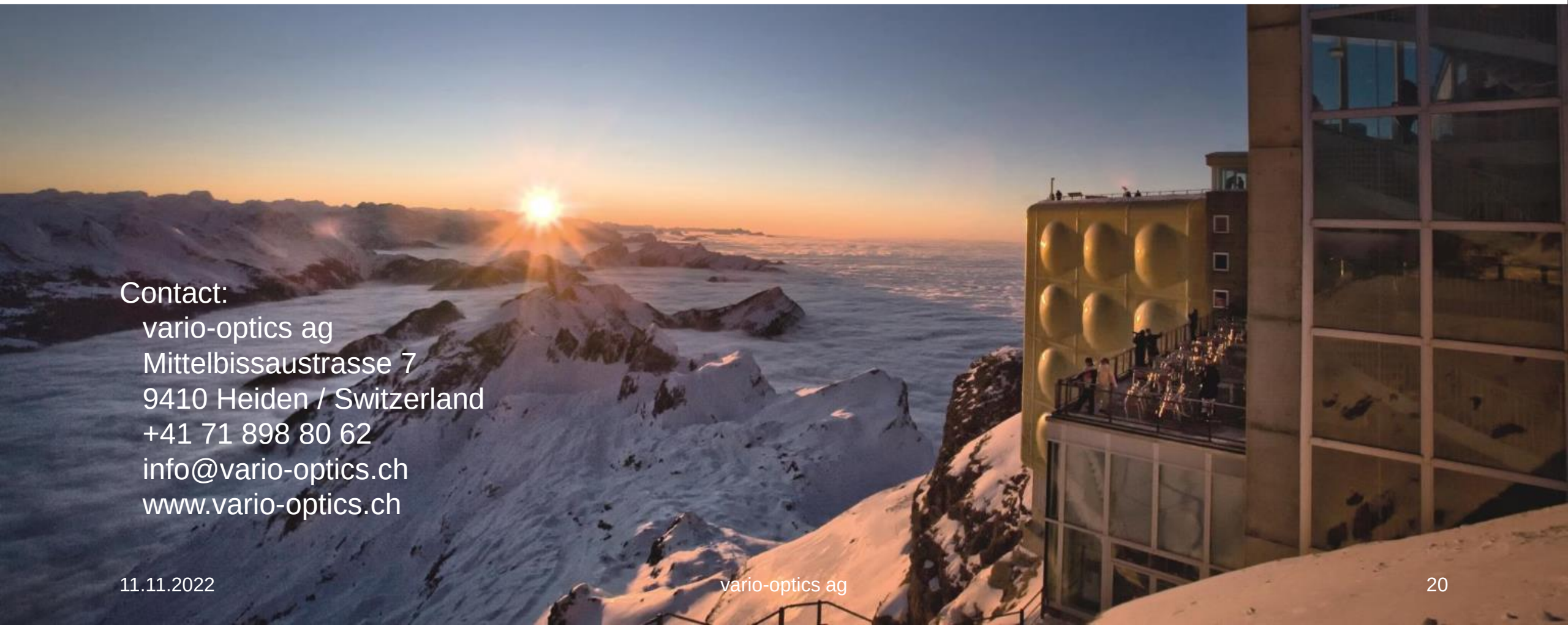
Avanced Materials & Processes

Wrap up & Take aways

- Lesson 1: advertise Photonics!
- Lesson 2: Co-Engineering starts in the design phase
- Lesson 3: Focus on collaborations & mutual benefits



The Future is Bright !



Contact:
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