



**EPIC**  
European Photonics  
Industry Consortium



**Monday, 11 May 2020, 16:00 CEST**  
**EPIC Online Technology Meeting on Biosensors**



**PIXAPP**  
Photonic Packaging  
Pilot Line




 **PHOTONICS**<sup>21</sup>

PHOTONICS PUBLIC PRIVATE PARTNERSHIP

**Nuria Teigell Beneitez (imec-UGent)**



**PIXAPP**  
Pilot Line

**EPIC Online Technology Meeting on Biosensors**  
Nuria Teigell Beneitez, imec-UGent



 **PHOTONICS**<sup>21</sup>

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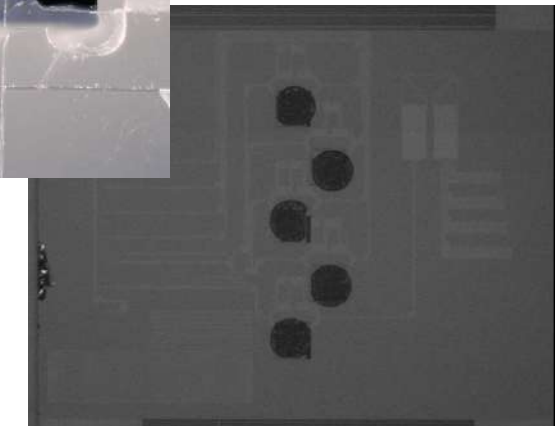
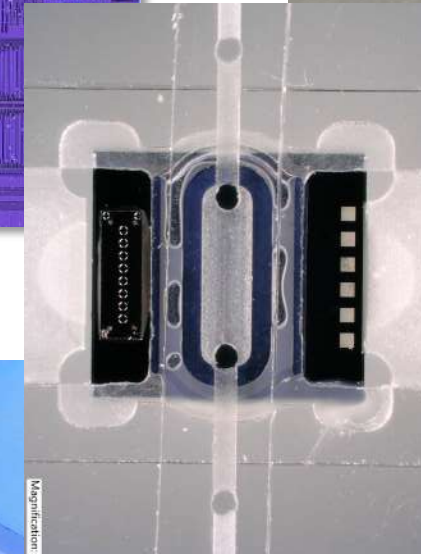
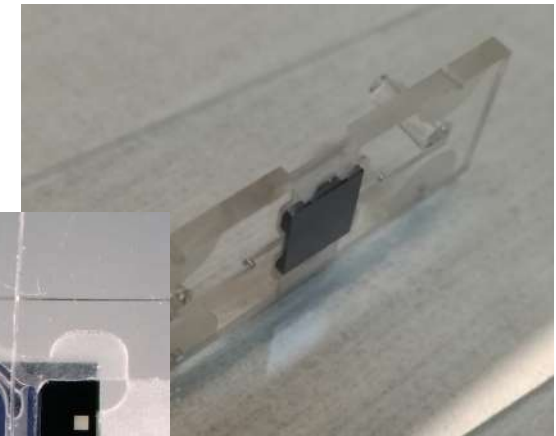
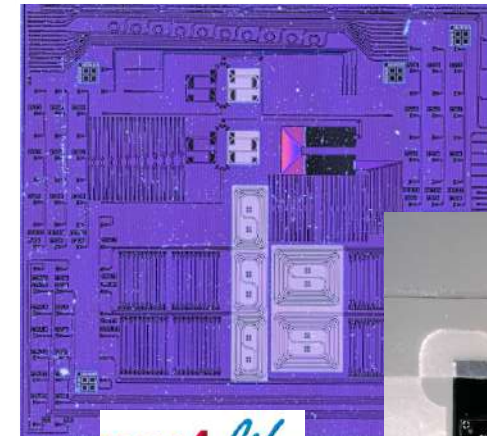
# PIXAPP Pilot Line

- Combine Europe’s assembly and packaging technology leaders into a **unified Open Access Pilot Line**
- Establish a **Gateway for companies** that want to develop a product
- **Standardization**
  - PIC standards
  - Building blocks (menu)
  - Integration and packaging technologies
- **Validation through demonstrators**



# PIXAPP pilot Line

Standard Building blocks + assembly standards = fast and cost-effective integration into complex systems



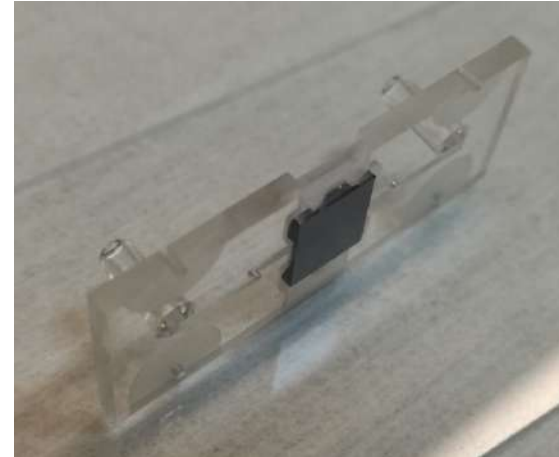


## Specifications:

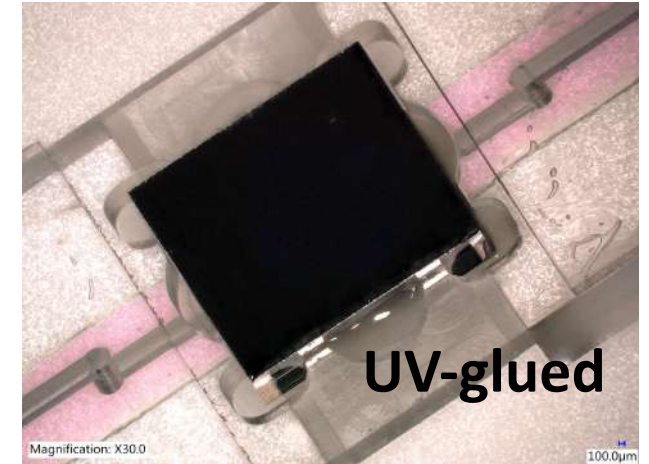
- Consumable, easy-to-use and low-cost
- Easy to use, external compact reader
- Proof-of-concept demonstration on established bio-assay (CRP protein)

## Main Challenges:

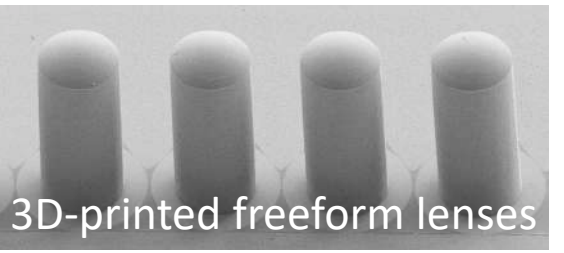
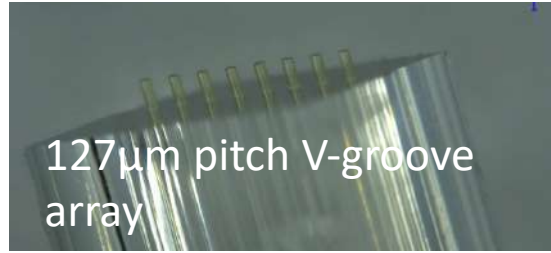
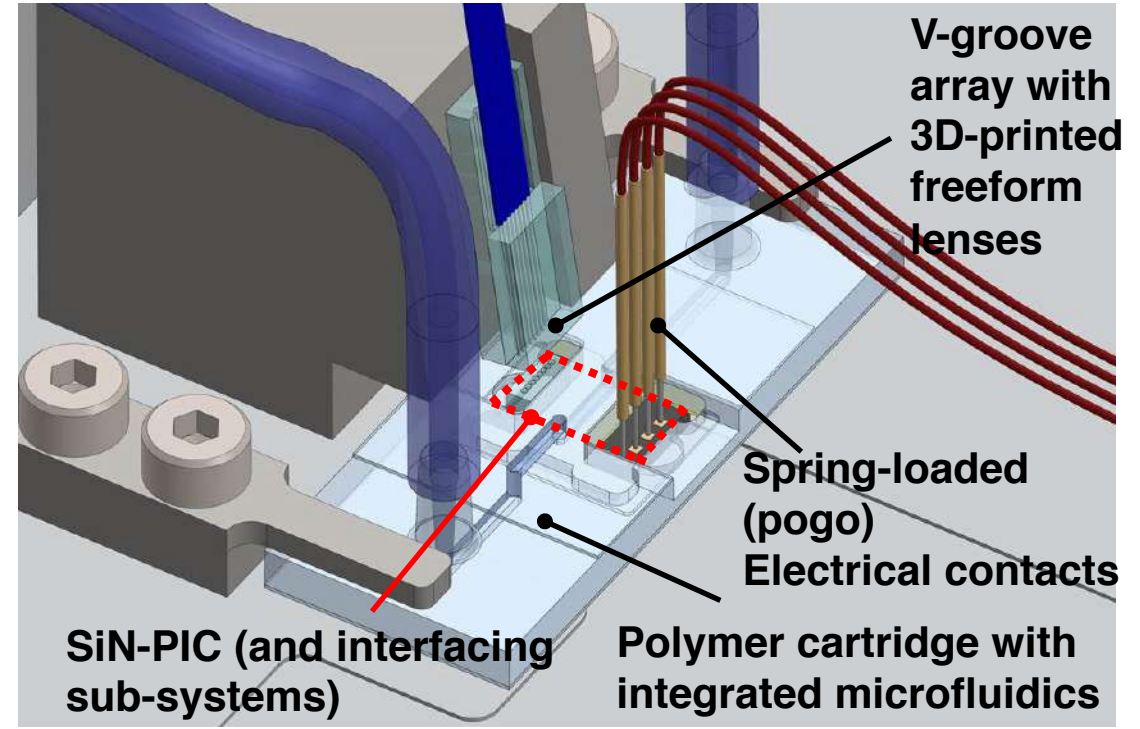
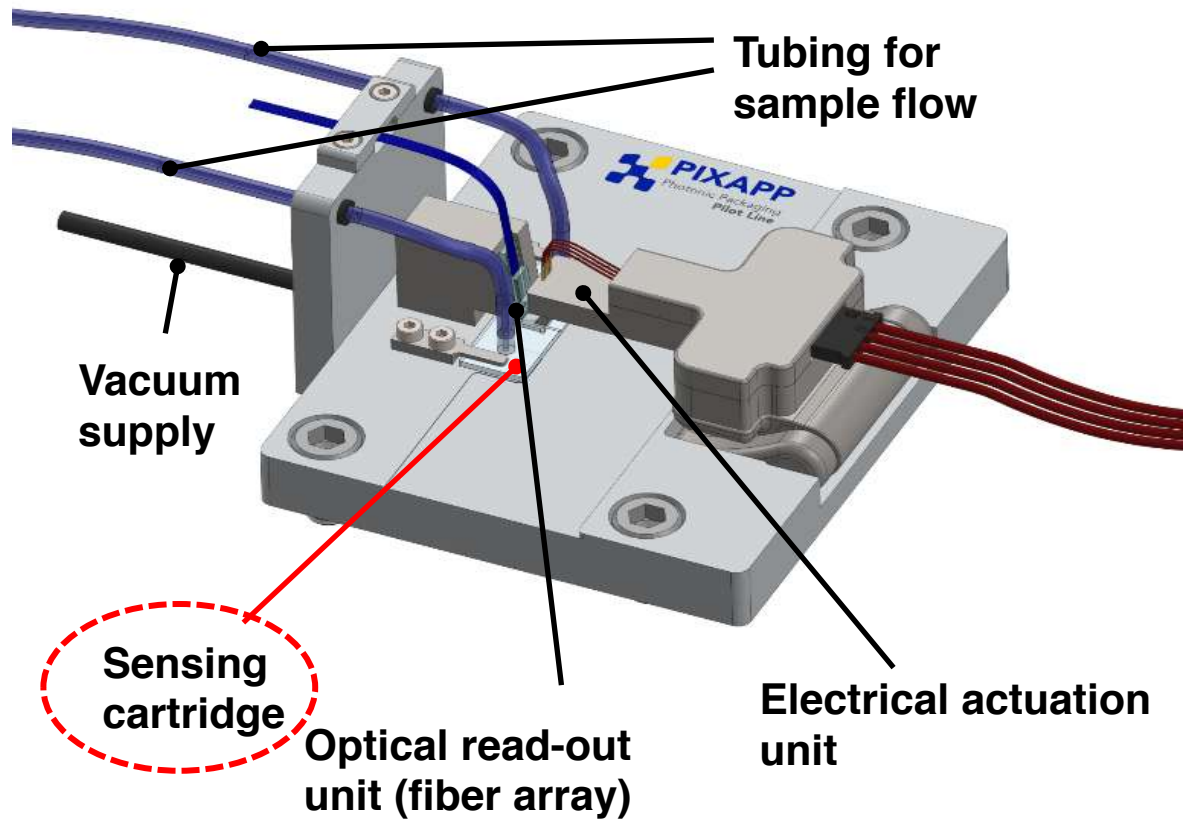
- Manufacturing packaging process flow compatible with the bio-functionalization
- Development of optics relaxing the alignment tolerances



Disposable cartridge with integrated microfluidics



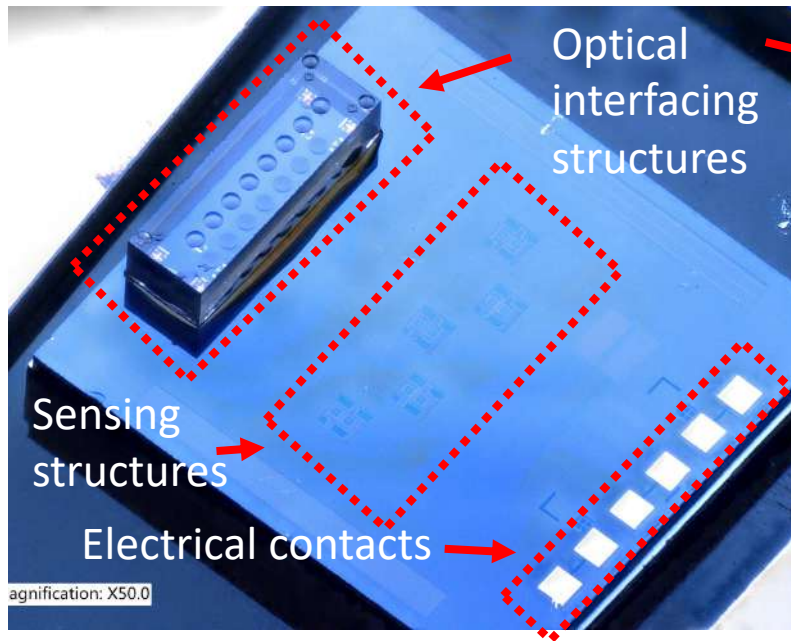
Detail of the back of the cartridge. The chip substrate protrudes out, serving as mechanical alignment feature



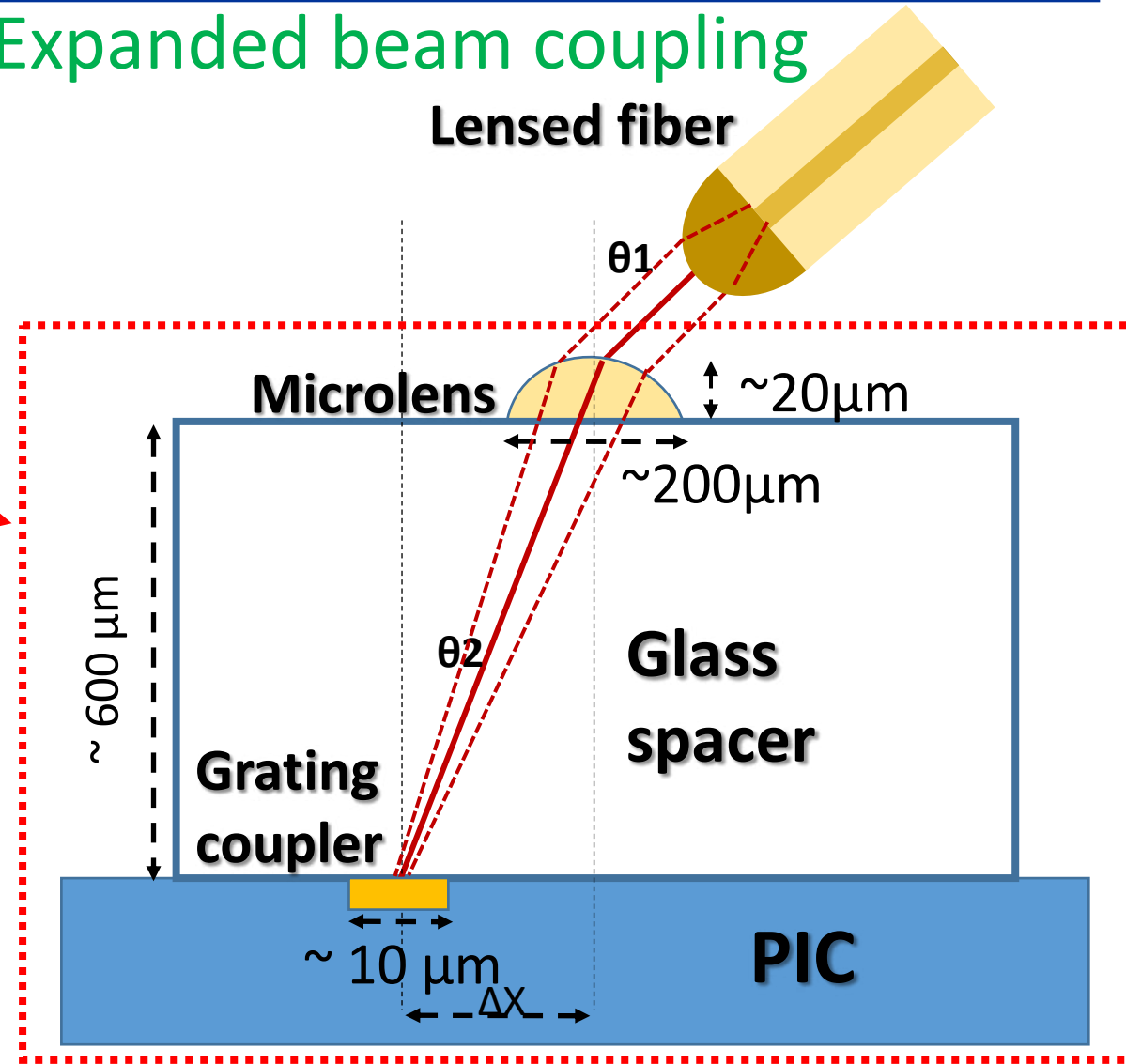
**Compact reader developed by Tyndall**

**KIT lens array with microlenses**

**Disposable cartridge** → System should be **highly tolerant** to mis-alignment for free space optical coupling (and electrical contact) with **minimal and fast alignment procedures**



## Expanded beam coupling

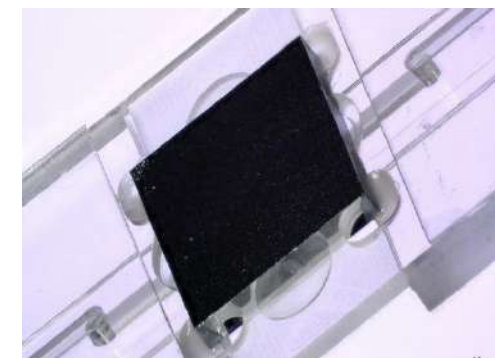
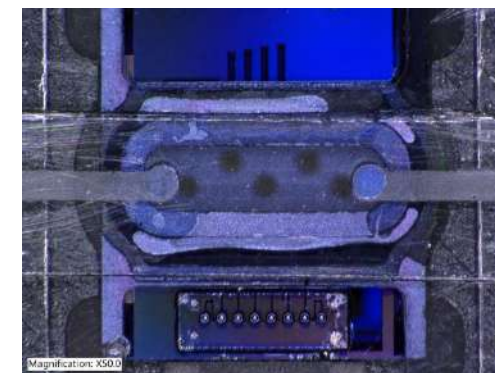
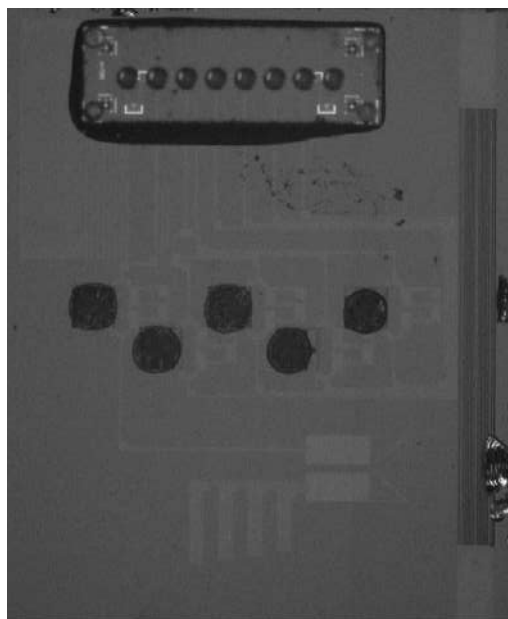
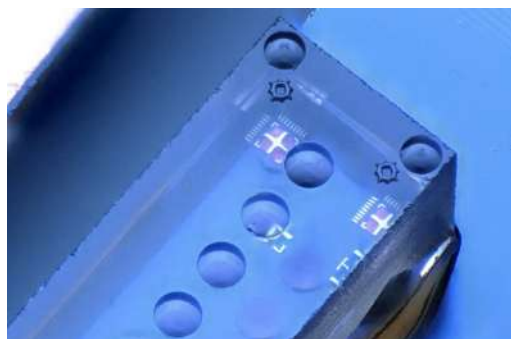


# Assembly flow

**Microlens Block Fabrication and assembly in functionalized SiN PIX4Life PICS (imec)**

**Bio-functionalization: Spotting of CPR Antibodies (Randox)**

**PIC Assembly Into ChipShop Polymer Microfluidic Cartridge (Argotech)**



Tyndall  
National Institute  
for Materials Research

imec

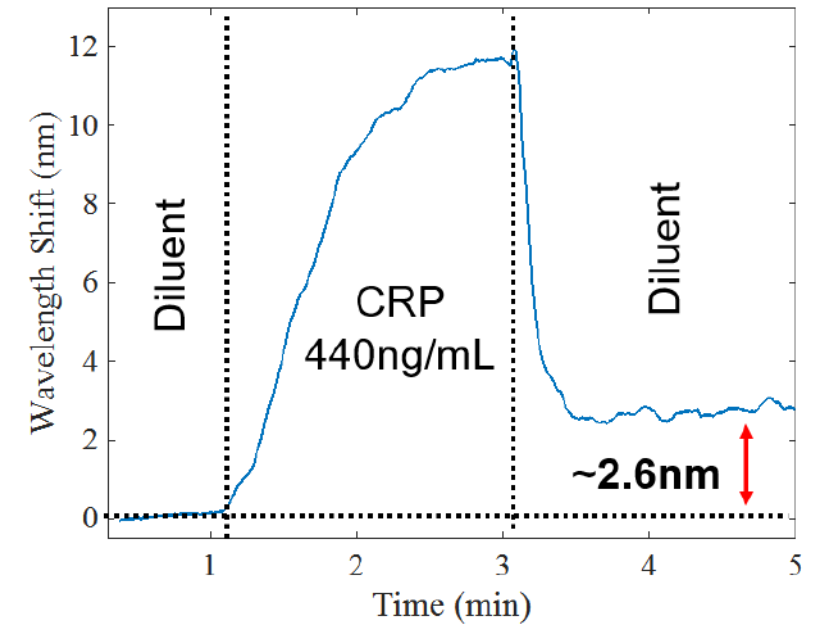
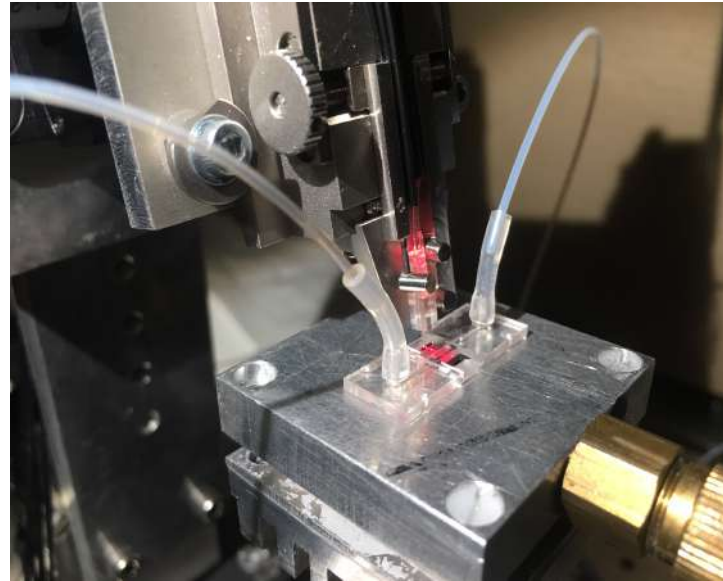
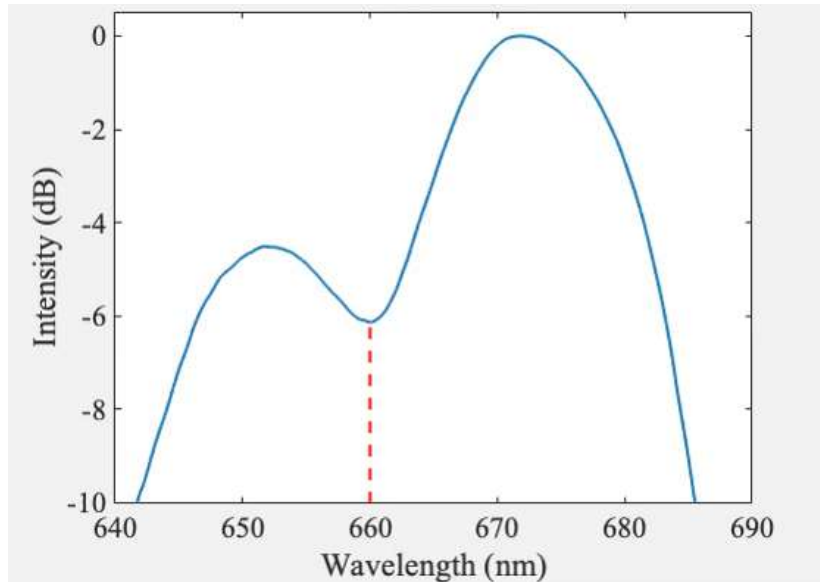
RANDOX

Argotech

microfluidic  
ChipShop

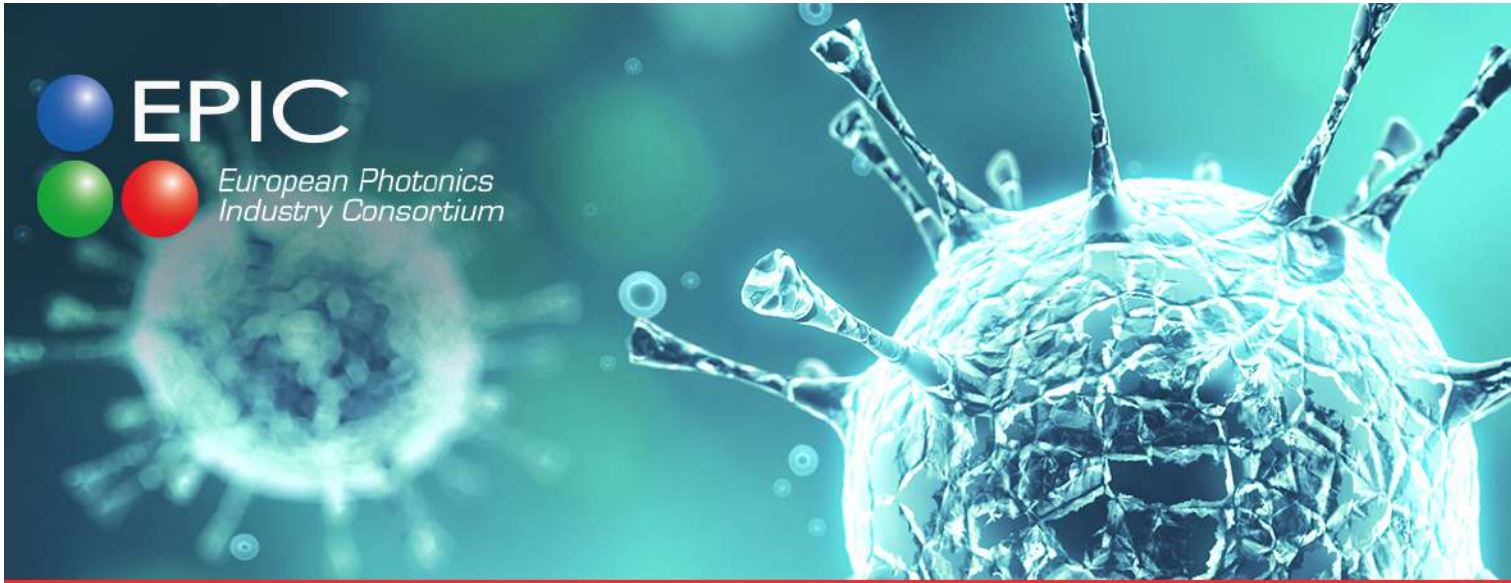
KIT  
Karlsruhe Institute of Technology

\*Pictures provided by Argotech



- A bioassay for CRP protein detection was performed on a completely assembled cartridge.
- CRP antigen bound to the SiN waveguide causing a change in refractive index (thus shifting the output interference pattern).
- **Demonstration of biosensing capabilities accomplished within the PIXAPP packaging assembly flow for clinically relevant CRP concentration**





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Photonics Research Group (imec-Ugent)

[Nuria.TeigellBeneitez@Ugent.be](mailto:Nuria.TeigellBeneitez@Ugent.be)  
[teigel76@imec.be](mailto:teigel76@imec.be)



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