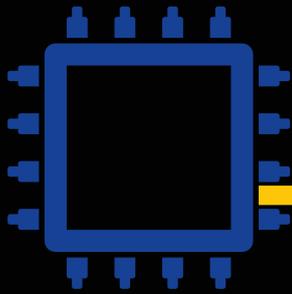




Enhanced and scalable  
photonic integration technology.



# OIP4NWE

## Open Innovation PIC Pilot

## Open-Innovation Photonics pilot line for North West Europe

The Interreg NWE project OIP4NWE aims at establishing an open innovation pilot line for the development of generic photonic integration technology. Integrated photonics is the emerging technology where the manipulation of light takes place on a chip, which could make some components an order of magnitude cheaper, smaller and more energy-efficient compared to today's solutions. By providing technology support to SMEs across Europe, the project contributes to strengthen the competitiveness and innovativeness of European SME sustainably on the global markets. The pilot line will be established in four phases:

### **Set-up**

Create an open-access pilot line for generic PICs through open innovation. The pilot line will comprise 3 consecutive manufacturing stages for creating the raw PICs (part of the equipment will be installed at TUE, NL; manufacturing is done by SMART, NL), integration of optics (VUB, BE) and integral packaging (TNI, IE).

### **Validation**

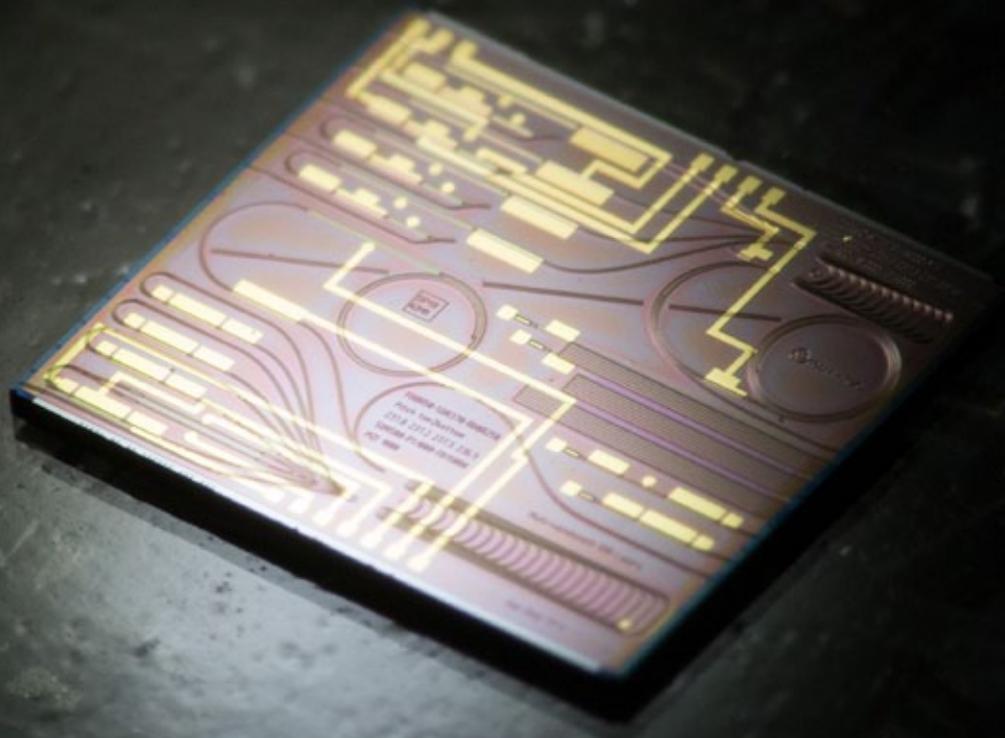
The pilot line will be evaluated and validated by the participating SMEs Technobis Fibre Technologies, mBryonics Limited and VTEC Lasers & Sensors.

### **Voucher**

As first stimulation of uptake in SMEs, a voucher scheme for 7 external SMEs will be set up, to provide technology support which contributes to increasing the maturity of their product. We will share the activities of these SMEs in our dissemination activities as showcases during and after the project, showing what is possible within our open innovation model.

### **Long-term**

A TransNational Network (TNN) will be set up including business clusters to reach out to SMEs in all relevant sectors. The current partners TNI (PIXAPP), TUE (JeP-PIX Pilot Line), VUB (ACTPHAST), Photonics Bretagne, Photon Delta and Cluster NMWP.NRW form a solid basis for this TNN.

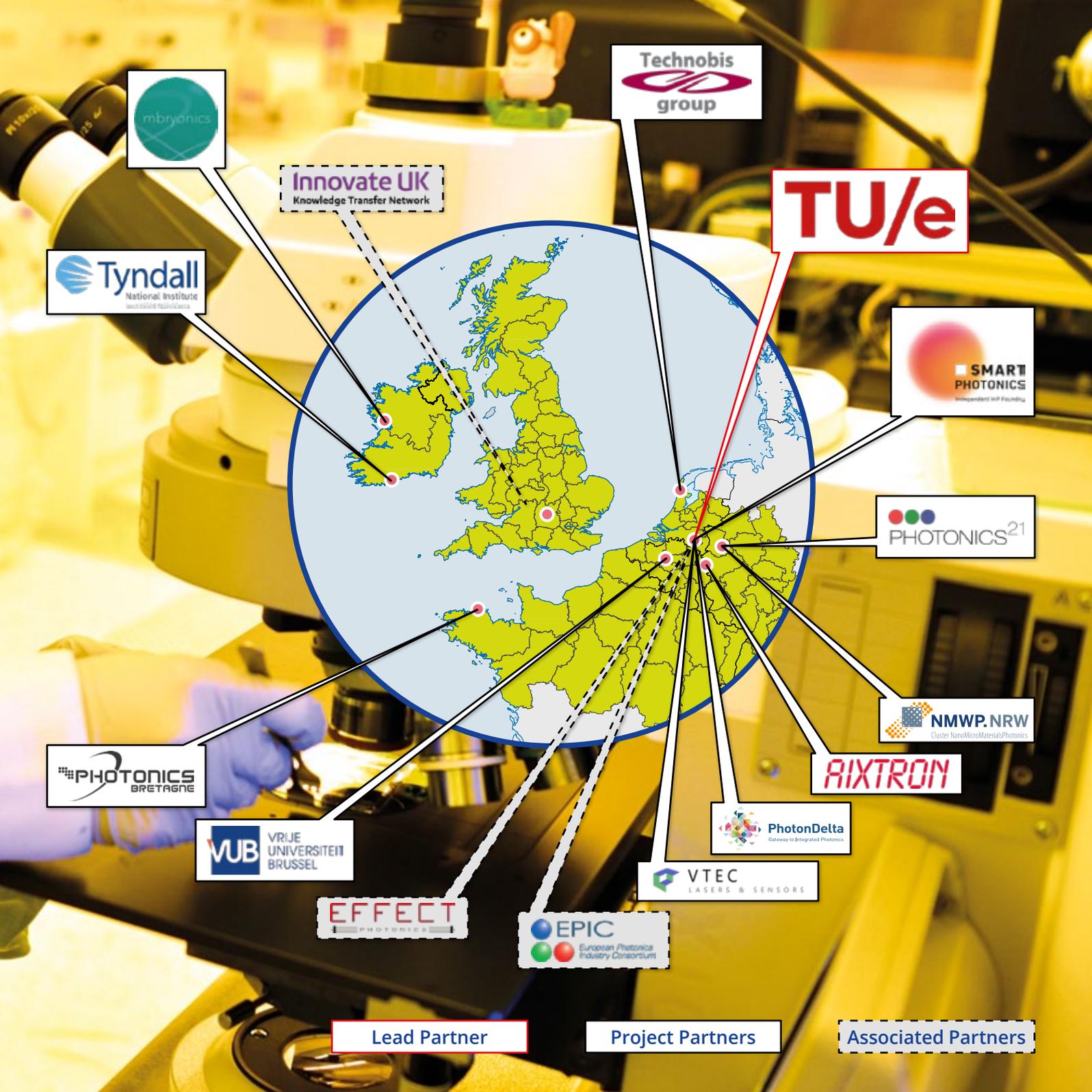




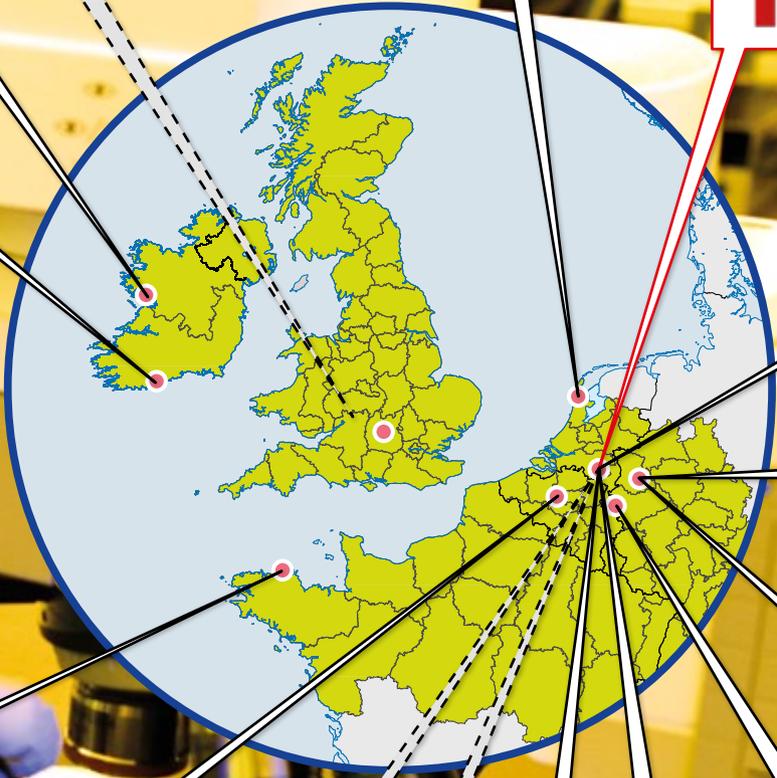
## The OIP4NWE consortium

OIP4NWE unites seven enterprises, three research institutes and four innovation clusters. It includes innovation leaders (Netherlands, Belgium, Germany), strong innovators (Ireland, United Kingdom) and a high-potential region in France.





Innovate UK  
Knowledge Transfer Network



Lead Partner

Project Partners

Associated Partners



## OIP4NWE Vouchers – be one of the first to benefit from the newly set-up Open Innovation PIC pilot line!

The OIP4NWE project aims at establishing an open innovation pilot line for the development of generic photonic integration technology. Equipment manufacturers, a pure-play foundry and researchers collaborate to establish the infrastructure and processes dedicated to the pilot production of photonic integrated circuits (PICs) based on Indium Phosphide. The capabilities will include packaging and external optics as well.

Be one of the first companies to test the PIC pilot line. After the pilot line has been set up and validated, a voucher scheme for 7 small and medium-sized enterprises will be set up to contribute to an increased maturity of their product.

### **When is the call for vouchers opening?**

The call will open in early 2021.

### **What are the minimum requirements to access the voucher call?**

1. The applicant should be an SME according to the European definition. Applications of intermediaries such as consultants etc. are not eligible.
2. The applicant should be based in North-West Europe (regional and sectorial distribution will be pursued; [www.nweurope.eu/about-the-programme/the-nwe-area/](http://www.nweurope.eu/about-the-programme/the-nwe-area/)).
3. The applicant should have demonstrated the technical feasibility of his application proposal, i.e. the applicant should have a PIC design ready and preferably a validated prototype (the TRL level of their current PIC should be 4). Proposals for proof-of-concept type demonstrators are not eligible.



4. The applicant should demonstrate a business case for scale-up to volume production and/or how the funded project will positively impact their future business.

5. Voucher recipients should agree to collaborate at technical level (open innovation framework) and on documenting their use case to be used as dissemination material to attract other users of the pilot line, during as well as after the project.

#### **What does the voucher cover?**

- Mentoring and support on non-technical aspects of PIC implementation.
- Design verification to check compatibility of the PIC design with the OIP4NWE pilot line.

- Preparation of integration of the PIC into the product of the SME.

- Manufacturing of the PICs on the OIP4NWE pilot line.

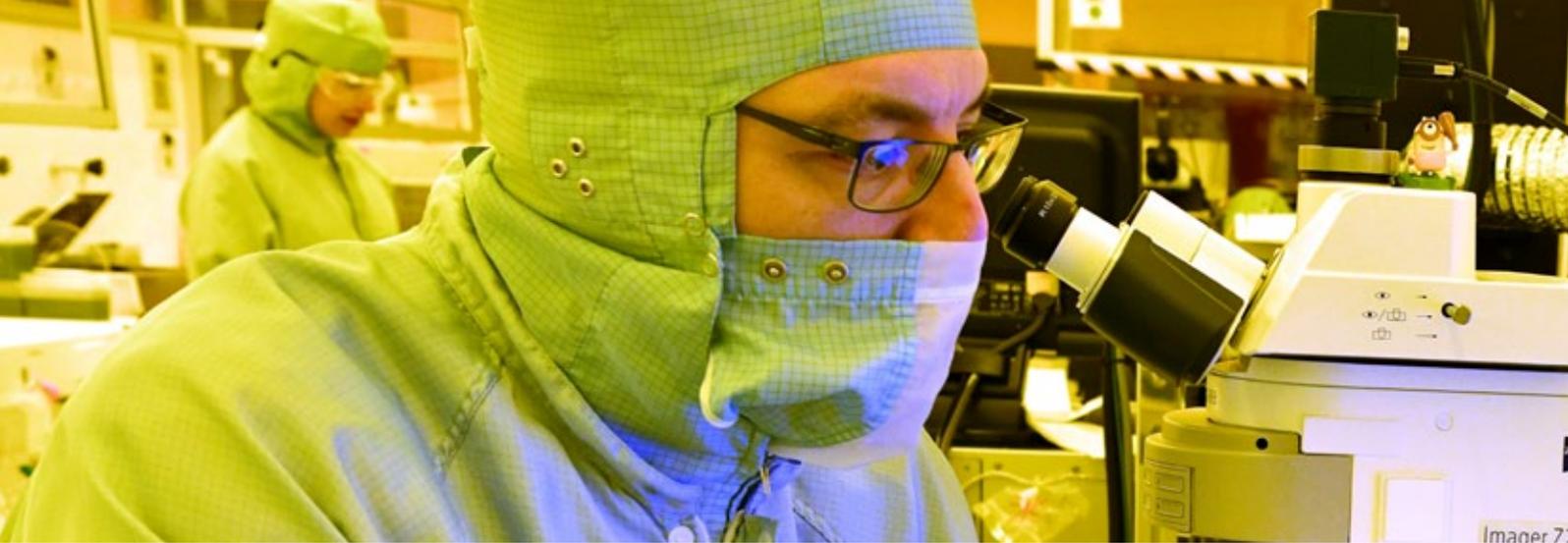
#### **How can I get into contact for further questions or a voucher application?**

Please contact the leader of the OIP4NWE voucher scheme work package:

#### **Jürgen Van Erps**

Vrije Universiteit Brussel

✉ [voucher@oip4nwe.eu](mailto:voucher@oip4nwe.eu)



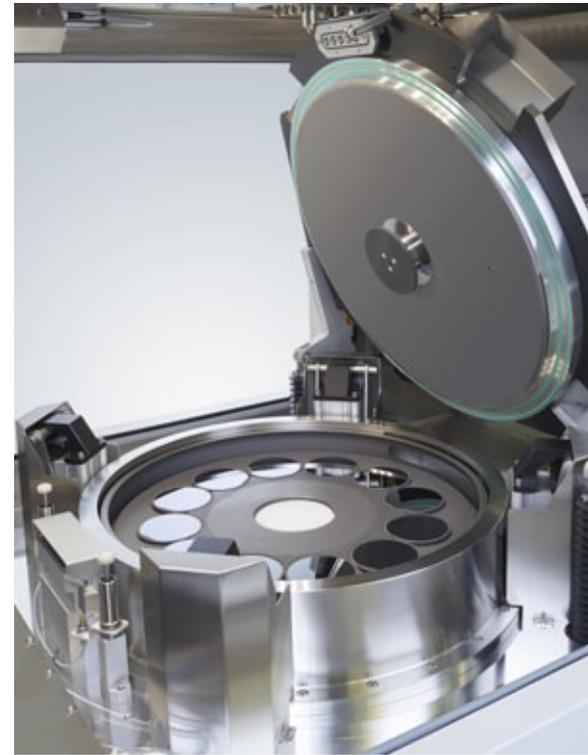
## Open innovation for more reliable PIC manufacturing Pilot Line part 1 – front-end.

The front-end of the pilot line capabilities will be implemented at the premises of the Eindhoven University of Technology and will be complemented and operated by SMART Photonics during the project execution. The infrastructure investments will be instrumental for the transition to a manufacturing with higher yield and lower costs, enabled by more accurate processing of larger Indium Phosphide substrates (4 inch) with a high degree of automation in wafers handling.

The industrial research phase consists of equipment and process development for epitaxy, deposition of

dielectrics and semiconductor etching, which are key processes in the manufacturing of PICs. The epitaxy and PECVD equipment will allow for highly uniform growth of semiconductors and deposition of dielectric layers, respectively, also, etching processes with high throughput and etch depth accuracy of waveguide structures will become available. Such state-of-the-art equipment and processes will be used to improve the maturity of PICs manufacturing.

*Authors: Anne Kwak, Victor Dolores Calzadilla  
– Eindhoven University of Technology.*



*MOCVD (Metal Organic Chemical Vapor Deposition) deposition system for the deposition of semiconductor layer structures on 4 inch wafers.*

*It will be part of the front end of the pilot line for PIC production. The system features automatic cassette-to-cassette loading to reduce particle contamination.*





## Optical interfacing of PICs with the outside world Pilot Line part 2 – back-end: optics.

The first part of the back-end of the pilot line capabilities, involving the optical interfacing of PICs, will be implemented at the premises of the Photonics Campus Gooik of the Vrije Universiteit Brussel. The infrastructure and equipment investments will be instrumental for the manufacturing of high-quality micro-optical and micro-mechanical components with sub-micrometer precision and short machining times.

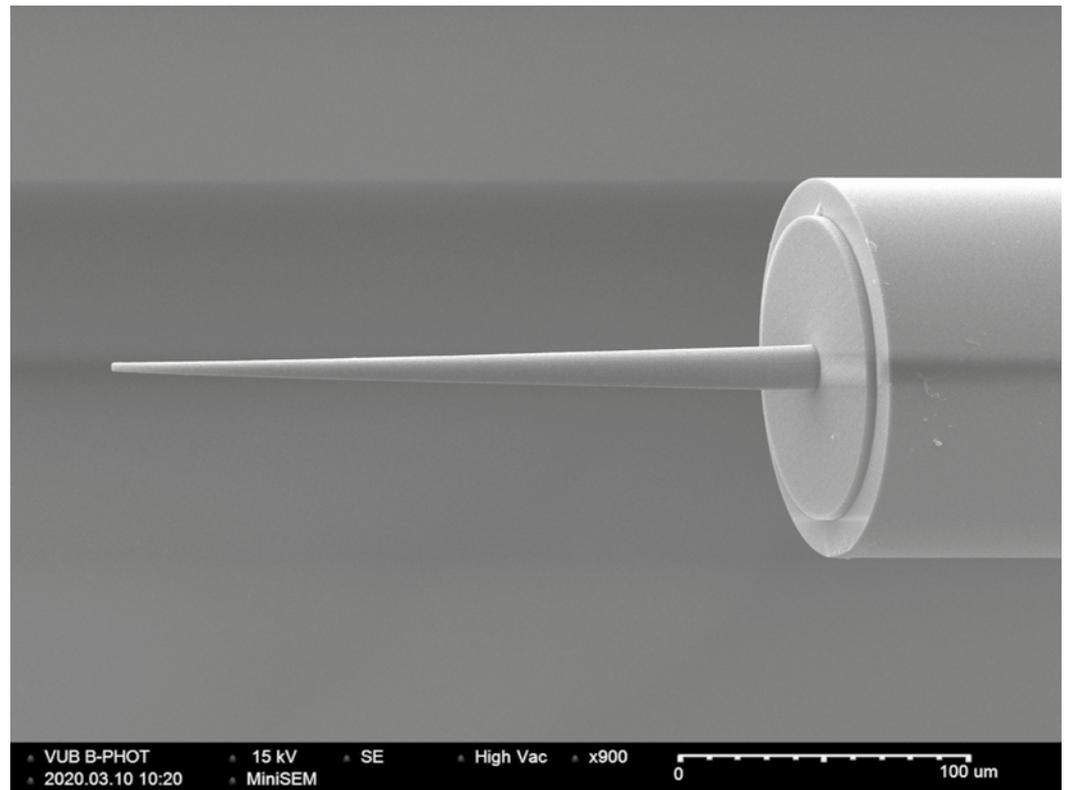
The industrial research phase consists of equipment and process development for the fabrication and integration of optical lenses and coupling structures that are key in the interfacing of PICs with the outside world. Indeed, light sensing and light generating PICs (e.g. for

medical, automotive, agrifood) need optical in- and outputs. Laser-based micro-machining allows the fabrication of refractive or diffractive optical components and of mechanical alignment features to achieve high-precision alignment and high-efficiency coupling to the PIC for various applications. In addition, it allows the creation of optofluidics devices where an interface between the PIC and microfluidic channels is foreseen to achieve high-performance labs-on-chips. Such state-of-the-art equipment and processes will be used to improve the robustness and the maturity of PIC interfacing.

*Author: Jürgen Van Erps  
– Vrije Universiteit Brussel.*



*Scanning Electron  
Microscope image of  
a downtaper printed  
on a single-mode  
optical fiber as mode  
conversion structure  
for maximizing the  
fiber-to-PIC coupling  
efficiency.*



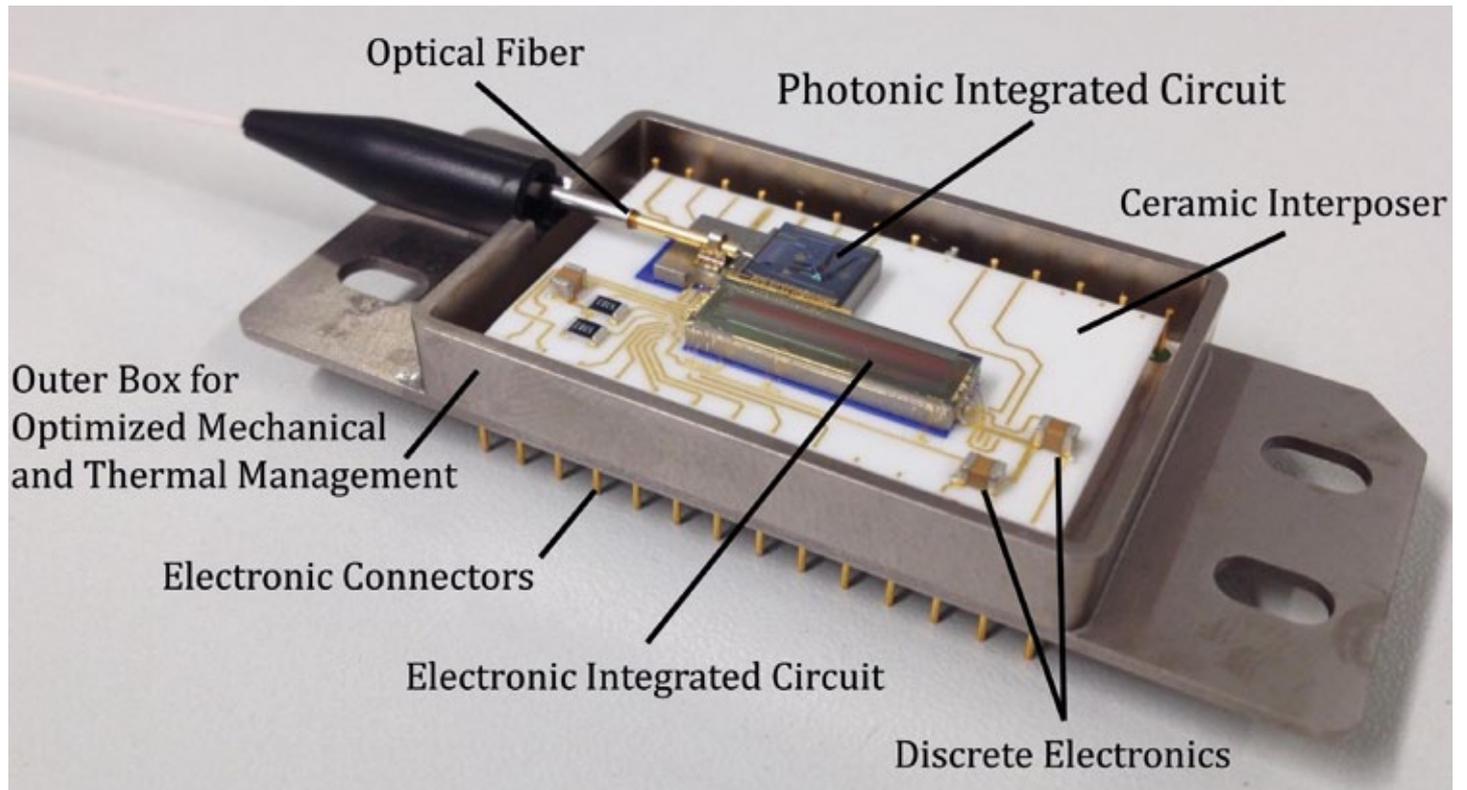


## Integrated Photonics Packaging Pilot Line part 3 – back-end: packaging.

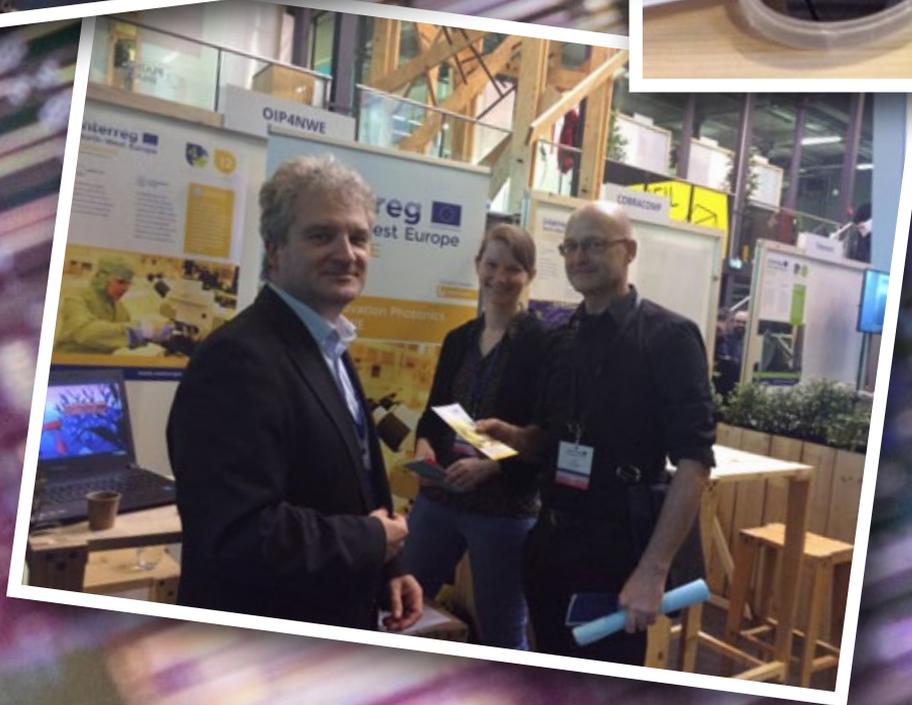
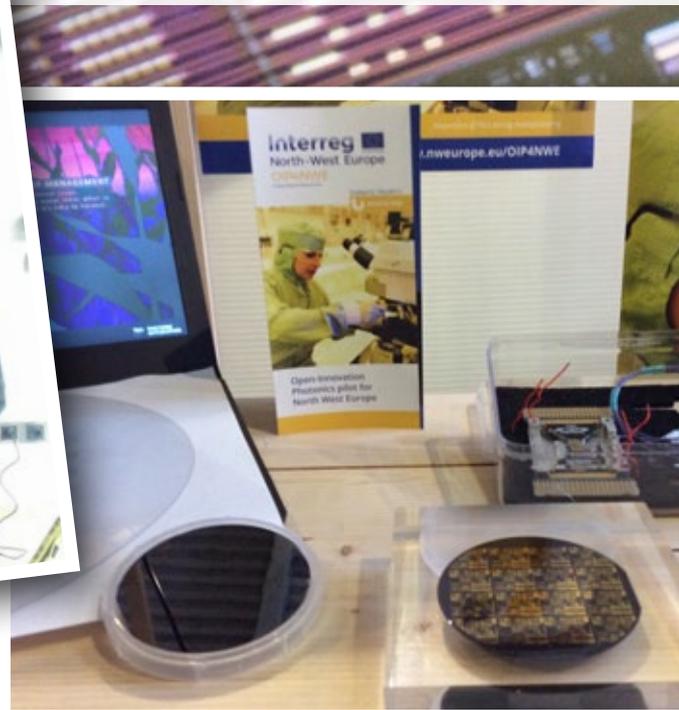
The second part of the back-end of the pilot line capabilities will be implemented at the premises of the Tyndall National Institute in Cork, Ireland and will be operated by Photonics Packaging Group during the project execution. The infrastructure investments will be instrumental for the optimisation of the ultra-precision connectors required for PIC packaging. The industrial research phase consists of the equipment and process development for a fully PIC packaged solution, therefore interfacing the PIC to the environment via an assembly of optimized connections with glass-fibres and electronics. The assembly of multi-level electrical interposers in glass/ceramic will be designed for high-frequency applications and high density PIC connections. The aim is to increase the electrical alignment control thus reducing

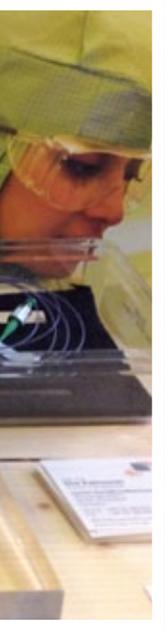
the rejection rate in conjunction with an improvement of the fiber alignment procedure to guarantee a high standard connection characterized by low loss optical coupling together with a fundamental advance in the thermal management of the packages. This is crucial as high-frequency devices generate large amounts of heat that could negatively affect the PIC performance and ultimately irretrievably damage parts of the circuit.

*Author: Donal Behal  
– Tyndall National Institute - UCC.*



OIP4NWE on tour...





# How can you be involved?

## Voucher Scheme

Be one of the first companies to test the PIC pilot line. After the pilot line has been set up and validated, a voucher scheme for 7 small and medium-sized enterprises will be set up to contribute to increasing the maturity of their product.

## Stay informed

Find more information on your participation and details of the Interreg NWE project at [www.oip4nwe.eu](http://www.oip4nwe.eu)



## Your Contact to OIP4NWE

General information:  [contact@oip4nwe.eu](mailto:contact@oip4nwe.eu)

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 [www.oip4nwe.eu](http://www.oip4nwe.eu)



As from first hy 2020