Interreg North-West Europe
EUROPEAN UNION
OIP4NWE
European Regional Development Fund

NEWS
April 2019

European partners build efficient pilot production line for photonic chips.

Photonics is an emerging technology with a potential multitrillion market. Innovative small and medium sized enterprises (SMEs) are at the forefront of this development, but the R&D costs are prohibitive for them. That's why 12 partners from northwestern Europe are creating an open access pilot line that will drastically reduce costs and time for the pilot production of new products. The 14 million euro project (OIP4NWE) is supported by the European Regional Development Fund and kicked off in November, 2018 in Eindhoven.

Photonics is much like electronics, but instead of electrons it uses light (photons) as its workhorse. It uses much less energy, it is faster, and it opens up a wealth of new opportunities. One of the key problems photonics will help tackle is the exploding energy consumption of data centers, as photonic microchips consume much less energy than their electronic predecessors. Another example is a high-precision monitoring system for aircraft wings, bridges or tall buildings.

After two decades of photonics research, the generic photonic integration technology is enabling the first products – sparsely. One of the main hurdles is the high cost involved in R&D. Not only does the PIC production require expensive high-tech equipment installed in cleanrooms, but currently the production processes of generic technologies

still have a high defect rate and are too slow. This was workable for basic research but not for commercial R&D of generic PICs. The technology readiness level, which ranges from 1 to 9, needs to be jacked up from the current 4 to 7.

At the kick-off event, the project consortium deepened ideas and the knowledge gained.

The new project, led by photonics stronghold Eindhoven University of Technology (in collaboration with its Photonic Integration Technology Center), consists of the realization of an efficient pilot production line for shared use by European SMEs. It should take the defect rate in pilot production down and the throughput time will be shorter. All in all, this should lead to a cost reduction which significantly lowers the threshold for developing new photonic products.

The front-end process (production of PICs on indium phosphide wafers) will be realized in the existing NanoLab@TU/e cleanroom facility at Eindhoven University. The PICs of different companies will be combined on one wafer to keep costs low. The back-end process is done at the Vrije Universiteit Brussel (Optics for beam shaping and light coupling) and at Tyndall National Institute in Cork, Ireland (Assembly of fiber-optic connections and electronics in the package). All steps require nanoscale precision to avoid product defects.

The first stage of the project is equipment installation. The second stage focusses on automation of the equipment while a third stage will involve intensive industrial research together with equipment manufacturers to optimize and develop new processes. The line should be fully in operation in 2022. To incentivize the initial uptake by SMEs, a voucher scheme for external SMEs will be set up. Through this scheme, SMEs will get access to generic photonic integrated circuits with higher maturity level than what is available today.

The other parties involved are the companies AIXTRON SE (Germany), SMART Photonics, VTEC Lasers & Sensors, Technobis Fibre Technologies (all Netherlands), mBryonics Limited (Ireland) and Oxford Instruments nanotechnology Tools (United Kingdom) along with research centers Photonics Bretagne (France), Cluster NMWP. NRW (Germany) and Photon Delta Cooperatie (Netherlands).

The project has a total budget of 13.9 million euros. Of this, the EU is funding 8.3 million, with the remainder coming from the participating parties.

OIP4NWE
Open Innovation PIC Pilot

The Interreg NWE-Project "OIP4NWE" aims at establishing an open innovation pilot line for the development of a generic photonic integration technology for the production of Indium Phosphide Photonic Integrated Circuits (PICs). Integrated photonics is the emerging technology where the manipulation of light takes place on a chip, making the components an order of magnitude cheaper, smaller and more energyefficient compared to today's solutions. By providing these services to SMEs across Europe, the project reduces PIC access barriers and strengthens the competitiveness and innovativeness of European SME sustainably on the global markets.

Current generic PIC facilities are of a laboratory nature and inadequate for manufacturing and packaging PICs with cost-efficiency, speed and reliable quality. There is a strong need to increase the technology readiness level (TRL) from the current 4 to 7. The equipment for PIC manufacturing and packaging is of an innovative, specialised nature that cannot be obtained from a single country. As application of PICs grows, North-West Europe needs to stay ahead. Therefore, intense collaboration between innovation stakeholders at transnational level is an important goal of the project.

The project is funded by the Interreg North-West Europe programme, which fosters transnational cooperation to make North-West Europe a key economic player and an attractive place to work and live, with high levels of innovation, sustainability and cohesion.