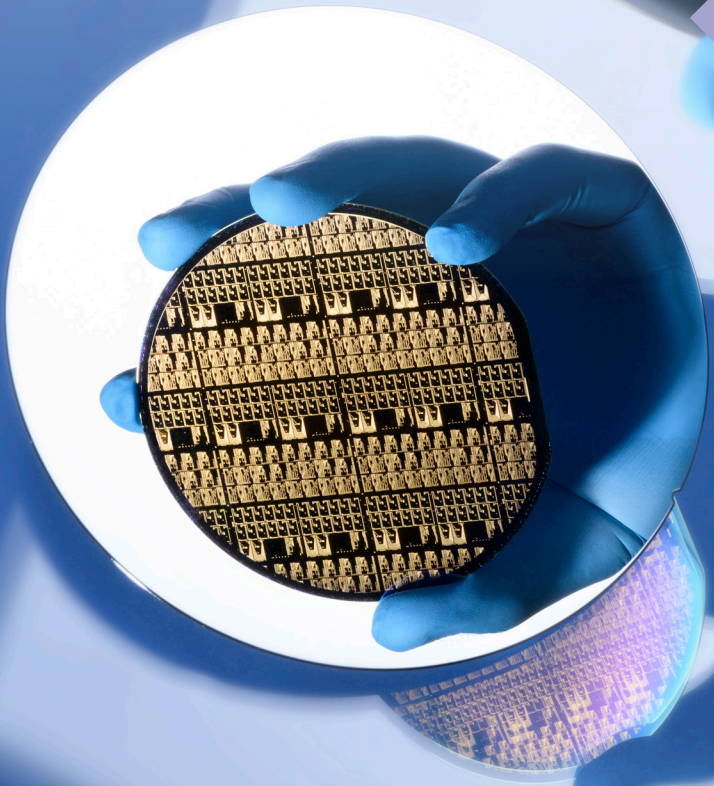
PIX·Europe



Europe's Pilot Line for Photonic Chip Innovation

pixeurope.eu

About PIXEurope

PIXEurope is the fifth Pilot Line initiative launched through the European Chips Joint Undertaking, established under the European Chips Act, to accelerate the development of photonic integrated circuit (PIC) technology – a critical enabler for high-speed computing, communications, quantum information systems, and beyond. It will be Europe's first fully integrated, distributed Pilot Line connecting the entire PIC value chain – from design and fabrication to integration, packaging, and testing – across multiple coordinated European sites within a unified and standardised framework.

With the participation of 20 institutions from 11 European countries (Austria, Belgium, Finland, France, Ireland, Italy, Poland, Portugal, Spain, the Netherlands and the United Kingdom), PIXEurope will master key technology platforms spanning a broad range of materials – from silicon and silicon nitride to indium phosphide, lithium niobate, and beyond – while also supporting hybrid integration and the co-integration of photonic and electronic chips. Through prototyping services, including Multi-Project Wafer runs, as well as access to advanced equipment and infrastructure, collaborative R&D projects, training and consultancy, the Pilot Line will serve companies of all sizes through a centralised open-access gateway.

The ultimate goal is to create a unique and thriving European PIC ecosystem – reducing time-to-market, lowering risks and costs, and transferring technologies with demonstrated maturity to large-volume manufacturers for scalable industrial production. In doing so, PIXEurope represents a decisive step toward European technological sovereignty in photonics, bridging the gap between scientific research and industry for the decades ahead.



Open Access Services

Prototyping and MPW

Design



PIXEurope supports design activities as part of prototyping, enabling users to prepare & develop photonic device layouts & system concepts - supporting the transition from initial concept to fabrication-ready designs.

Fabrication



Dedicated Runs (available now)

Silicon Nitride (SiN)
Various stack configurations & layer thicknesses; may include thermal tuning & process adaptations.

Ultra-Low-Loss Silicon Nitride (ULL-SiN)
For applications requiring low propagation loss; may include thermal tuning & structural access to the waveguide layer.

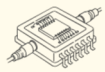
Thin-Film Lithium Niobate (TFLN)
Precise waveguide definition & electro-optic integration, with optional electrode integration for modulation & tuning.

Silicon-on-Insulator (SOI)
Passive & active device integration, with optional heaters, photodiodes, or custom process steps.

Heterogeneous Integration (Micro-Transfer Print)
Integrates selected components across different photonic platforms, combining material systems & device types in a single system.

MPWs (available later)
Multi-project wafer (MPW) access will launch as platform capabilities and design kits become available, providing a scalable, standardised route to fabrication alongside existing dedicated runs.

Packaging



PIXEurope provides access to advanced photonic packaging capabilities as part of prototyping, integrating photonic and electronic components into functional, testable systems - including assembly & integration, fibre & optical coupling, interposer-based approaches, co-packaging, & package -level testing & validation.

Testing & Reliability



PIXEurope is developing methods for advanced materials analysis, automated testing & reliability analysis, available as part of the prototyping service from 2028 onwards.

Open Access Services

Use of Equipment and Infrastructure

The PIXEurope Photonics Pilot Line offers access to infrastructure equipped with a wide range of photonic chip manufacturing techniques suitable for a broad range of materials. Over 500 systems to be incorporated into the fabrication and characterisation facilities of the PIXEurope community.

Lithography & Patterning

Incl.: I-line Stepper, DUV Scanner & Stepper, Direct Laser & Laser Patterning, EBL & FIB-SEM, Nano Imprinter, Mask & Maskless Aligner, Displacement Talbot & AFM-based Lithography, Photoresist Clean Tracks, Laser Patterning

Thin Film Deposition & Material Growth, Doping

Precise thickness & composition control, incl. epitaxial growth & doping. *Incl.: PECVD, LPCVD, MOCVD, PVD, Sputter, ALD, PEALD, Thermal Evaporation, Ion Implantation*

Etching & Material Removal

Dry and wet etching. *Incl.: ICP-RIE, DRIE, RIE, IBE, Laser Induced, Plasma & Chemical Etching*

Cleaning & Surface Preparation

Removes contaminants, particles & residues for process quality & adhesion. *Incl.: Plasma Cleaner, Ozone Cleaner, Wet Benches*

Wafer/Chip Testing

Incl.: Automated Wafer-Level Test, Reliability, Inspection & Burn-in, Wafer Prober & Defectivity Detection, High Frequency Probes, Lightwave & Optical Characterisation, Climate Test Chamber

Microscopy

For inspection, defect analysis & structural verification at micro- & nano-scale. *Incl.: SEM, CDSEM, FIB-SEM, sMIM, X-ray Microscope, XPS, XRD, Inspection Optical & Confocal Microscope, ToF-SIMS*

Metrology

Incl.: Mechanical & Optical Profilometer, Ellipsometer, Thickness & Bow Probe, 4-Point Resistivity Probe, Raman Spectroscopy, Spectrometer

Wafer Processing & Mechanical Operations

Dicing, grinding, polishing & handling. *Incl.: CMP, Plasma Dicing, Dicing Tools, Ion Polisher, Lapping & Polishing*

Thermal Processing

Controlled heating cycles to modify material properties. *Incl.: Oxidation & Diffusion Furnaces, Rapid Thermal Annealing, Vacuum Solder Reflow Oven*

Assembly, Packaging & Integration for Hybrid BEOL (Back End of Line)

Incl.: Micro-Transfer Printing, Liquid Crystal Device Assembly, Pick & Place, Flip-Chip Bonder, CNC Milling & Laminating Press, Wire Bonding, 3D Printer

Terms & Conditions: *Access to equipment depends on material platform (Si3N4, Al2O3, Thick SOI, InP), wafer size (100–200mm) & partner-specific terms & conditions. Other materials or sizes may be possible upon user request.*

Open Access Services

Training

Advancing Skills for Europe's Photonic Integrated Circuit Manufacturing Ecosystem

Photonic Integrated Circuits (PICs) are a key enabling technology for applications ranging from artificial intelligence and high-speed communications to sensing, healthcare, and quantum technologies. As the European photonics sector grows, so does the demand for skilled professionals in PIC design, manufacturing, packaging, testing, and integration.

To address this need, PIXEurope is developing a comprehensive training programme that connects technology innovation with workforce development. Closely aligned with the pilot line's capabilities, the programme provides low-barrier access to advanced equipment, technologies, and expertise, helping to build the skills needed for Europe's future photonics workforce.

The programme spans the entire PIC manufacturing value chain, covering topics such as:



- *PIC design for manufacturing*
- *Fabrication processes*
- *Packaging and heterogeneous integration*
- *Testing, characterisation, and reliability*
- *Equipment operation and production readiness*

Designed primarily for industrial users, including SMEs and start-ups, it supports engineers, technicians, researchers, and technology leaders seeking practical competencies in advanced photonic manufacturing. Training is directly linked to pilot-line activities, giving access to state-of-the-art facilities, real manufacturing environments, and leading experts across Europe.

PIXEurope is developing a flexible, modular training framework so participants can build skills progressively and focus on technologies most relevant to their roles.

Training begins in January 2027, with the full portfolio available by May 2028. By then, PIXEurope aims to offer 46 modular courses and train around 1,000 participants annually, strengthening Europe's talent pipeline and the long-term competitiveness of the semiconductor and photonics sectors.

Open Access Services

Consultancy

PIXEurope consultancy services provide industry and public organisations with access to leading deep tech expertise in optics, photonic integrated circuits, lasers, and optoelectronic systems. These services apply established research knowledge to solve practical technological challenges through tailored advisory support.

Consultancy Services include:

- ***PIC design for manufacturing***
- ***Process design advice***
- ***Technical risk analysis***
- ***Recommendations on materials, equipment, and workflows***
- ***Feasibility assessments (if user technology can be scaled)***
- ***Scale-up strategy (steps toward industrialisation)***

Key Characteristics



On-demand expertise (time and project based)



Advisory deliverables (models, recommendations, reports)



No ownership transfer (IP remains with service provider or is licensed)



Outcome support



End-User retains responsibility for execution

Detailed terms regarding pricing, intellectual property, and confidentiality are defined on a case-by-case basis and may require appropriate agreements (e.g., NDA) prior to the start of the service.

Access to the consultancy service is provided within the PIXEurope framework and follows an open-access principle, subject to eligibility criteria defined at the Pilot Line level.

Open Access Services

Collaborative R&D Projects

The PIXEurope Collaborative R&D Projects model harnesses the considerable ongoing developments within the wider research community. It is specifically targeted at users at the heart of Europe's PIC ecosystem who wish to join forces with PIXEurope Partners to accelerate the technological progress of the Pilot Line.

In contrast to the other PIXEurope services, Collaborative R&D Projects adhere strictly to the work plan of the Pilot Line, and results from Collaborative R&D Projects must be available through services to all eligible users. The goal is to accelerate the technology development through open innovation.

Monolithic integration platforms

- Ultra-low-loss & moderate-loss SiN platforms, incl. waveguides, modulators & fibre-chip coupling
- Visible light SiN platform (400–700 nm)
- Near infrared platforms with high density integration
- Indium Phosphide manufacturing for O-band, C-band & 2 micron wavelengths

Heterogeneous Integration

- Scalable, high-speed integration of SiN/SiP/InP PICs with electronic driving chips, packaging & assembly into multi-chip modules
- Hybrid material platforms incl. colloidal quantum dots, graphene & thin-film lithium niobate

Metrology

- Improving test accuracy, reliability, throughput, speed & scalability
- Wafer Level Test & inspection up to 300mm, incl. Automated Test Equipment & data flow standardisation
- Advanced material characterisation of PIC structures

Packaging

- Fibre-chip coupling, co-packaging, automated assembly & alignment, thermal management & manufacturable package architectures
- Interposer technology for optical & electrical connectivity

Demonstrator circuits

- Optical switching devices







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Partners

Co-funded by

National Funding Agencies