



## THE PHOENIX RESEARCH AND INNOVATION PROJECT TOWARDS THE CREATION OF PHOTONIC INTEGRATED CIRCUITS FOR THE NEXT GENERATION OF ENCRYPTION AND COMPUTING HARDWARE

**PHOENIX**, “**Ferroelectric PHOtonics ENabling novel functionalities and enhanced performance of neXt generation PICs**”, funded by the EU **Horizon Europe** programme, gathers a full panel of industrial, research and technology organizations from EU member states and Associated Countries, coordinated by **KATHOLIEKE UNIVERSITEIT LEUVEN** (Belgium), such as SMEs **Lumiphase** (Switzerland) and **Optalysys** (UK), **IBM** (Switzerland and Israel), the **Nanophotonics Technology Center – Universitat Politècnica de València** (Spain), and **PNO Innovation** (Spain). The **PHOENIX** project started the 1<sup>st</sup> September 2022 and will run for 3 years until the 31 August 2025.

Europe aims to maintain and increase Europe’s industrial leadership in photonics by fostering photonics manufacturing and accelerating Europe’s innovation process to reduce the time-to-market for novel products, stimulating the creation of strong and complementary value chains around photonics and facilitating access to the manufacturing capabilities of highly innovative SMEs.

The creation of such an ecosystem will cement EU leadership in photonics, stimulating private investment in research and development and business creation, resulting in jobs generation and economic growth. Furthermore, it will contribute to the EU’s technological sovereignty, industrial competitiveness and independence, and support EU **industrial** and **digital** strategies.

On 14<sup>th</sup> September 2023, **PHOENIX** partners met for the first time in Leuven, Belgium for the kick-off meeting of the project. **PHOENIX** with a total budget 5.25M€ has been granted with 3.5M€ from the European Union’s **Horizon Europe** research and innovation programme to leverage compact photonic integrated circuits (PIC) offering continuous and efficient control over optical signals.

**The PHOENIX Project’s main goal is to create building blocks for the next generation of encryption and computing hardware, offering continuous and efficient control**



**over optical signals and enhanced functionalities stemming from a combination of materials having a metal-insulator transition with epitaxial ferroelectrics. The developed technologies will be demonstrated in four use cases in the fields of encryption, wireless telecommunications, and neuromorphic computing.**

During the 36-month duration of the project, **PHOENIX** partners are committed to accomplish the following ambitious objectives:

1. Provide novel photonic technologies with enhanced functionalities thanks to the integration of VOx and BTO.
2. Provide a BTO/SiN waveguide platform for subsequent manufacturing of PICs and an upgraded version of such a platform integrating VOx with the potential to improve their performance and scalability.
3. Build up the demonstrators.
4. Advance in the understanding, realization and upscaling of high-quality oxide thin-films by molecular beam epitaxy (MBE) on large area.
5. Develop business models to foster SME's access to advanced PIC technology.

**PHOENIX partners will work towards the creation of the next generation of compact PICs, leveraging Lumiphase's barium titanate (BTO) on silicon nitride (SiN) platform that will be optimized to enable novel functionalities and produce enhanced PICs.**

The **PHOENIX** project is expected to generate the following scientific, societal, economic and technological outcomes and impacts:

- ✓ Innovative materials and technologies beyond the SotA for developing advanced materials integration, building blocks, and PICs with enhanced functionalities, reduced footprint and power consumption.
- ✓ Leadership in BTO/SiN technology combined with VOx and enhanced MBE control techniques to strengthen EU position and technological sovereignty in these critical technologies.
- ✓ Increased adoption of photonics technologies by demonstrating them in four application use cases in high-impact emerging fast-growing markets.
- ✓ Foster market uptake and business and economic sustainability of the BTO/SiN platform and the developed products, enabling access to high-tech SMEs, technology providers, and research institutions and associations.
- ✓ Reduction of time-to-market and costs to commercialize innovative photonic products.
- ✓ Training and improving knowledge and skills of MSc and PhD candidates in the field of photonics to prepare next generation EU photonics workforce.

**PHOENIX will also allow the creation of employment opportunities within Europe** by strengthening the EU market share in the worldwide photonics marketplace, creating gender equal opportunities, high-quality jobs and facilitating SME growth by providing access to the BTO/SiN open platform,



following and leveraging the first-demonstration experience of SME companies such as Optalysys and the worldwide pioneering IBM.

## PHOENIX Consortium

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