PHOENIX

Ferroelectric PHOtonics ENablIng novel functionalities and enhanced performance of neXt generation PICs

ABOUT THE PROJECT

In PHOENIX, "Ferroelectric PHOtonics ENablIng novel functionalities and enhanced performance of neXt generation PICs", funded by the EU Horizon Europe programme (GA 101070690), a consortium formed by Partners Lumiphase (CH), Optalysys (UK), IBM Research (CH and IL), Nanophotonics Technology Center - Universitat Politècnica de València (UPV) (ES), PNO Innovation (ES), and the Institute of Physics of the Czech Academy of Sciences (FZU) (CZ), coordinated by KU Leuven (BE), have joined their forces to create building blocks for the next generation of encryption and computing hardware. They will leverage compact photonic integrated circuits (PIC) offering a continuous and efficient control over optical signals. The PIC chips are based on Lumiphase's proprietary technology, and enhanced with novel functionalities using materials developed at KUL and UPV. Epitaxial technology will be advanced through the realization and upscaling of high-quality oxide thin-films.

RESULTS AND OUTLOOK

In the first 30 months of the project we have screened and identified the requirements for material, device and hardware design for the demonstrators. Deposition of VOx on BTO surfaces, annealing and material characterization was performed to identify the process conditions for the manufacturing of hybrid VOx/BTO devices, while fabrication and optical characterization of waveguides was performed to identify the process conditions for the manufacturing of hybrid VOx/BTO devices. In addition, the PIC for the first multi-process-wafer round was released. We have been working on PIC design to manufacture the first chip demonstrator to validate basic functionalities using BTO technology, as well as to manufacture the first demonstrator as a photonic engine for deep neural network and for fully homomorphic encryption.

In the last 12 months of the project, we will perform calculations to determine the limits of the dielectric response in the PIC materials and perform ex-situ THz characterization of the dielectric losses. Ultimately, the full set-up of the use cases demonstrators will be built and evaluated.

CONSORTIUM

KU LEUVEN · Nanophotonics Technology Center · Universitat Politècnica de València · IBM · PNO INNOVATION · Lumiphase · IBM Research Europe · Optalysys · FZU

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