POLYmer based electro-optic PCB motherboard integration with Si_3N_4 Chiplets, InP Components and Electronic ICs enabling affordable photonic modules for THz Sensing and quantum computing applications

Deliverable D7.2

POLYNICES Promotion video presentation

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Document History

Version	Date dd.mm.yy	From > To	Description
0.1	01.03.23	ICCS > ICCS	First draft of the storyboard
0.2	05.04.23	ICCS > ICCS	Second draft of the storyboard
0.3	09.09.23	ICCS > ICCS	First version of the project video
0.4	13.11.23	ICCS > ICCS	Second version of the project video
1.0	**10.01.24**	**ICCS > EC**	**Final version and submission of the D7.2**

Executive Summary

We have prepared and made available a video that addresses the general public, and describes the need for POLYNICES technology and the basic approaches of this technology for the development of flexible electro-optic printed circuit board (PCB) that will facilitate the integration of FMCW THz spectrometers and quantum information processors.

The video has a total duration of 3 min and 36 sec and is based on the use of 2D and 3D graphics and animations. The video was made available through the main page of POLYNICES website and through the social media accounts of the project.

Keywords: POLYNICES, promotion video, FMCW THz spectrometer, Quantum information processor, electro-optic PCB

1 INTRODUCTION

The POLYNICES Project's Video Presentation aims to provide a concise overview of the project in a way that is comprehensible to a broad audience. A video presentation produced and released in the social media and the POLYNICES official website. In this way, additional material will be available for dissemination purposes keeping the POLYNICES project in the foreground. The video is coordinated by ICCS and is assigned to a specialized graphics and video designer to ensure a professional and high-quality result.

The video project presentation concept follows a stepwise approach: The video is starting from the definition of the challenges and needs that POLYNICES Project aims to deal with and the impact that they have in the photonic integration process. Additionally, the solutions and technologies that will be developed within POLYNICES project are presented along with the innovations of the project and the results that they will bring with respect to the development of FMCW THz spectrometers and quantum information processors.

At the end of the video presentation, the contact details (i.e. official project website address) and the list of project partners, as well as with a banner that acknowledges support by the European Commission, according to the EC guidelines for dissemination.

The POLYNICES Project Video Presentation has been distributed through the dissemination/communication channels of POLYNICES as well as the communication channels of all partners within the project.

2 POLYNICES PROMOTION VIDEO

ICCS coordinated the preparation of the POLYNICES Project Video presentation, working in close collaboration with the experts of the graphic design to ensure a professional and broadly comprehensible result. Both the voice-over text and the animations were carefully consolidated and in some cases, different versions were considered and reviewed. The final voice-over text of the POLYNICES video is presented below:

"*Photonic technology has been at the forefront of groundbreaking advancements of various industrial sectors, by revolutionizing the way we transmit, process, and manipulate information.*

Over the past few years, miniaturization and reduction of power consumption have been the holy grail of both industrial and academic research, leading to the development of compact and energy-efficient fully-integrated Photonic Integrated Circuits or PICs, mainly based on the monolithic integration, which relies on a single-material platform.

Nevertheless, the ever-increasing demand for enhanced on-chip functionalities requires the hybrid integration of multiple PICs fabricated on different - yet complementary - photonic platforms, which is pushing the boundaries of the already established fabrication and integration processes. As the number of PICs increases, achieving optimal alignment and routing of optical signals from one PIC to another become formidable tasks, often resulting in increased optical losses and decreased overall system efficiency.

An additional challenge involving cost and time, pertains to photonic packaging, which still deals with the photonic assembly of the hybrid PICs and their electrical connection to electronic integrated circuits as separate processes.

Traditional wirebonding of PICs to PCBs becomes challenging when the optical subassembly must combine several PICs with a very large number of electrical pads. In fact, it is estimated that packaging can account for more than 75% of the cost of a photonic module.

Eight partners from four European countries join their forces in POLYNICES project to overcome these costly barriers by developing a general-purpose photonic integration technology to facilitate the optical interconnection of multiplicity of PICs and their electrical connections to the electronics ICs.

To achieve this, POLYNICES will develop a polymer-based Electro-Optic Printed Circuit Board motherboard that embraces versatility by allowing the combination of silicon nitride chiplets, indium phosphide components, micro-optical elements, and Terahertz antennas.

The process proposed by POLYNICES is expected to reduce, by at least 10 times (!!!!), the production costs of photonic modules by allowing chiplets that accommodate different structures for different functionalities, to share physical dimensions and interfaces, thus defining standard building blocks.

POLYNICES paves the way to a tremendous customization and scalability potential with minimal effort and cost: Different functionalities can be installed in the motherboard by selecting the appropriate combination of chiplets, or the same chiplet can be installed multiple times, to scale-up the circuit.

The concepts of POLYNICES can establish a revolution within the revolution:

- *Fully integrated optoelectronic single- and multi-channel Frequency Modulated Continuous Wave Terahertz spectrometers enhanced with beam steering capabilities and*
- *quantum information processors with unprecedented performance*

POLYNICES. Turning photonics innovation into technology breakthroughs!"

Distribution of the POLYNICES video is carried out through the social media accounts of POLYNICES and the official project website. The links can be found below:

YouTube: https://youtu.be/QE64znHGLiA?si=reapnYz-mg2NRMDZ

Website: https://youtu.be/QE64znHGLiA

X (ex-Twitter): https://x.com/POLYNICES_EU/status/1745115553411325958?s=20

LinkedIn: https://www.linkedin.com/feed/update/urn:li:activity:7150879059508469760

3 CONCLUSIONS

POLYNICES promotional video developed and released towards the dissemination and communication of POLYNICES technology to the general public.