



Press Release

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NEXTGEN OPTOELECTRONIC DEVICES - AR & BIOSENSING

PZT & Graphene Innovations for Multiple Functionalities in a Miniaturized Footprint

Europe's leading position in photonics and electronics can only be secured by adapting to the next generation of optoelectronic device requirements: **high performance, multi-functionality, and cost efficiency in miniaturized footprint**. These can only be achieved if **novel schemes for on-chip integration emerge**.

Among the established platforms for optoelectronic integrated circuits (OEICs), the silicon nitride-based platform, TriPleX[®], stands out as a wide band and ultra-low loss material. It has been deployed in a variety of fields, from telecom to quantum computing to the life sciences, with reliable performance in each. However, it **has no active functionality**. The newly funded **Horizon Europe project MatEl** aims to introduce novel **on-chip integration schemes** to add active functions to TriPleX[®], enabled by innovative laser processing of advanced materials such as **graphene and PZT**.

In a period of three and a half years, technologies beyond the state-of-the-art of Laser Digital Processing (Laser Transfer and Laser Soldering) will be employed for the accurate and fast alignment and bonding of chip packages (OEIC) on TriPleX[®]. The resulting **hybrid platform** will be enhanced by the monolithic integration of **advanced materials** (graphene and high-quality PZT), which will enable multiple functionalities in a miniaturized footprint.









Overall, MatEl's hybrid platform will combine **the wide bandwidth and high confinement provided by TriPleX[®]**, with the **active functionality of III-V and II-VI lasers**.

MatEl aims to demonstrate the universal vision of the project on two TRL5 applications in **Augmented Reality (AR) and advanced biosensing**. These diverse demonstrations can in turn contribute to accelerating the adoption of hybrid OEICs across industries and to strengthening the EU photonics and microelectronics industrial capability.



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The consortium

Partner Name	Short name	Country
1. National Technical University of Athens	NTUA	 Greece
2. LIONIX International BV	LION	 Netherlands
3. PHIX BV	PHIX	 Netherlands
4. Graphenea Semiconductor SL	GRAPH	 Spain
5. SURFIX BV	SURF	 Netherlands
6. AMIRES SRO	AMI	 Czech Republic
7. PIEMACS SARL	PIEM	 Switzerland
8. CREAL SA	CREAL	 Switzerland



PIEMACS

phix

SURFIX
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