

JULY, 2026

NEWSLETTER

ISSUE 3



KEY FACTS



7 Partners



4 European countries



4 Years



3.6M+ EUR funding

WELCOME TO OUR 3RD PIONEAR NEWSLETTER!

Dear reader,

We are excited to present to you the third PIONEAR newsletter.

Inside, you will get a sneak peek at recent **achievements** from Lumiary (LUM), Tyndall National Institute at University College Cork (UCC), VIGO Photonics (VIGO), the Lodz University of Technology (TUL), the Eastern Switzerland University of Applied Sciences (OST) and Łukasiewicz Institute of Microelectronics & Photonics (L-IMIF).

You will also find information from partners and an interview about the importance of the **new collaboration** with Myfab, explaining that it brings a lot of new avenues to progress in the development of PIONEAR's microphone technology.

Next, we introduce two project **partners**: OST and TUL.

Then we describe the latest **outreach** activities, which involve PIONEAR's peer-reviewed publication and conference contributions.

Lastly, learn about upcoming **events** happening in the field of optical science and photonics!

*We hope you enjoy the read!
accelopment on behalf of the project consortium*

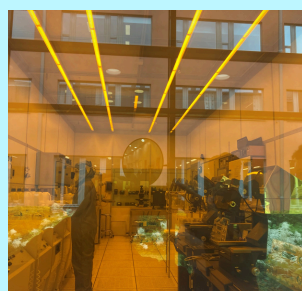
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Progress:

A sneak peak at PIONEAR's recent achievements from our partners

Lumiary (LUM) accelerates product development through collaboration with MyFab and Angström Laboratory

A collaboration that marks a significant step forward in LUM's product development journey. Starting in September 2025, LUM are partnering with MyFab and establishing a presence inside the Angström Laboratory's world-class cleanroom facilities in Uppsala, the largest of its kind in the Nordics.

With access to these advanced resources and infrastructure, we are now positioned to develop the next-generation lab prototype and begin building scalable production methods to support broader and more extensive testing. This partnership enables us to take key steps toward industrialisation, bringing us closer to a future where Lumiary's microphone technology can match the sensitivity of the human ear.

We anticipate an intense and exciting period ahead, full of learning and technical discoveries.

Tyndall National Institute at University College Cork (UCC)

Tyndall has successfully demonstrated micro-transfer printing of the VECSEL laser structures. The transfer yield over a range of target substrates is very high and on some treated glass surfaces the yield is 100%.

Transfer printing is a key enabling technology for PIONEAR, since it allows integration of miniaturized laser chips into the sound chamber. The process is repeatable, reproducible and allows alignment to the other critical components of the microphone is a micron precision. Current efforts are focused on reducing the number of process steps to achieve a high-yield transfer on various substrates.

VIGO Photonics (VIGO)

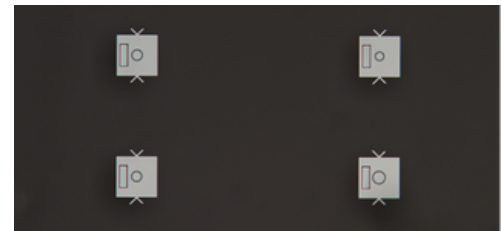
As the epitaxial fabrication partner within the PIONEAR consortium, we are excited to announce the successful growth of the advanced semiconductor wafer structures for the project's electrically pumped VCSELs. Utilizing high-precision MOCVD (Metal-Organic Chemical Vapour Deposition) techniques, our team deposited high-quality 940 nm laser structures on GaAs substrates, laying the material foundation for this groundbreaking technology.

We are proud to deliver these high-performance epitaxial structures to our consortium partners for the next stages of processing and assembly, bringing the vision of a better-than-human-ear photonic microphone one major step closer to reality. Currently, our efforts are focused on the development of optically pumped VCSEL structures.

>| Lumiary



Image provided by LUM. LUM's engineer and process developer Andreas shaking hands with Örjan Vallin at MyFab inside the cleanroom at Angström Laboratory.



Microscopic image of VECSEL chips transfer-printed onto a treated glass substrate with 100% yield. The size of each individual chip is 170µm. Provided by UCC.



Image provided by VIGO. The structure of an electrically pumped VCSEL on GaAs.

Progress:

A sneak peak at PIONEAR's recent achievements from our partners



Lodz University
of Technology

Lodz University of Technology (TUL): VECSEL

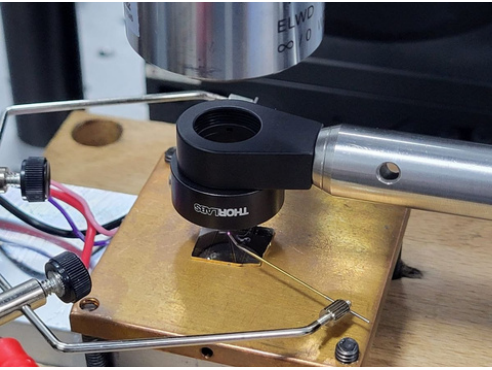


Image provided by TUL. Lasing of electrically pumped VECSEL

At Lodz University of Technology, we have been developing and testing VECSEL laser structures aimed at improving the performance of next-generation devices. Our work included numerical optimization and laboratory verification of laser operation, as well as the exploration of innovative lens geometries etched directly into epitaxial layers to enable efficient optical confinement without curved mirrors. In collaboration with Łukasiewicz Institute of Microelectronics and Photonics, an initial assessment of the proposed concepts was conducted in terms of their experimental feasibility. We also designed a new optically pumped structure for future microphone capsules. The structures were grown by VIGO Photonics, while optical characterization measurements provided valuable insights for further design improvements.



OST
Ostschweizer
Fachhochschule

Eastern Switzerland University of Applied Sciences (OST): Optical Thin Film Coating



Image provided by OST. Optical thin film coating.

For our external-cavity laser-based microphone, specialized mirror coatings are required that provide high reflectance ($HR > 99.9\%$) at the laser wavelength and anti-reflective properties ($AR < 5\%$) at the pump wavelength.

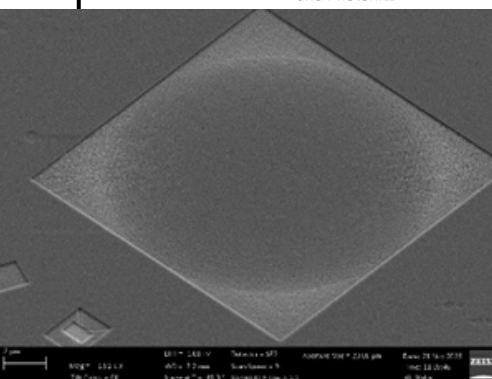
An initial coating design for this application was developed using thin film simulation. Initial layer stacks were successfully manufactured and characterized. They show the desired reflectance at the laser wavelength as well as low reflectance at the pump wavelength.

As a next step, the required multi-stage production process – including optical thin film coating and lithography-based patterning of the multilayers – will be optimized to provide the structured mirror coatings for the laser cavity.



Łukasiewicz
Institute of Microelectronics
and Photonics

Łukasiewicz Institute of Microelectronics & Photonics (L-IMIF)



SEM image of microlens provided by L-IMIF.

Besides the main objective of developing electrically pumped VECSEL laser chips operating at 940 nm, Łukasiewicz-IMIF is also developing microlenses that, once integrated into the laser structure, would considerably simplify the assembly and alignment of the external cavity mirror. Additionally, we have initiated the development of fabrication processes for optically pumped VECSEL coupons.

PIONEAR's GA:

Partners met in Uppsala, Sweden, for the project's 7th General Assembly Meeting

The PIONEAR consortium successfully convened for its 7th GA from 16-17 June 2026, hosted by LUM in Uppsala, Sweden. The event brought together all our consortium partners to share progress, discuss challenges and plan future directions for the ambitious research project.

Held at Hotel Villa Anna, the two-day in-person meeting brought together partners from across the consortium to review progress, discuss upcoming activities and coordinate the next steps towards PIONEAR's ambition to develop a novel miniature photonic microphone with better-than-human-ear sound quality.



PIONEAR consortium gathered in Uppsala

The General Assembly opened with a welcome by the Coordinator, Per Grön, from Lumiary, followed by a session led by accelopment on dissemination and exploitation, including communication. The first day continued with technical updates on the design and fabrication of the membrane and acoustic chamber, VCSEL design, fabrication and processing, and device design, digital signal processing and acoustic performance testing.



One of the cleanrooms at Myfab, Ångström Laboratory

On the first day, the consortium visited the Myfab Cleanroom at Ångström Laboratory (highlights of the day on the next page).

On the second day, partners focused on the progress of the microphone assembly and packaging using microtransfer printing, followed by the project management and coordination, including updates on the progress across deliverables and milestones, and a review of project risks.

The meeting concluded with a Scientific and Technical Group discussion, providing space for partners to align on technical priorities and future work. By combining expertise in photonics, micro-mechanics, VCSEL technology, device integration, packaging, project management and exploitation, the consortium continues to advance the foundations of a new generation of high-performance acoustic sensing technologies.



Scientific and Technical Group discussion

Interview:

PIONEAR partner talk about ...

Our project partner, Andreas Lundström, Developer and Engineer at LUM, highlighted the progress made so far. He underlined the importance of the new collaboration with Myfab, explaining that it brings a lot of new avenues to progress in the development of PIONEAR's microphone technology.

Through Myfab, LUM will benefit from access to advanced micro- and nanofabrication infrastructure, specialised expertise and cleanroom-based capabilities. Myfab is Sweden's national research infrastructure for micro- and nanofabrication and coordinates leading academic cleanroom-based nanotechnology laboratories across Sweden.

For PIONEAR, this access creates important opportunities to develop the next-generation lab prototype and to begin building scalable production methods. These steps are essential to support broader and more extensive testing of the microphone technology and to move closer to industrialisation.

As Andreas noted, the collaboration opens "a lot of new avenues" for the team. With stronger fabrication capabilities and a growing presence in Uppsala's advanced cleanroom environment, LUM is now better positioned to accelerate prototype development and contribute to PIONEAR's long-term ambition: enabling a new generation of miniature microphones that can match, and potentially surpass, the sensitivity of the human ear.

The GA marked an important opportunity for the PIONEAR partners to consolidate recent progress, exchange technical expertise and maintain a shared roadmap for the next phase.

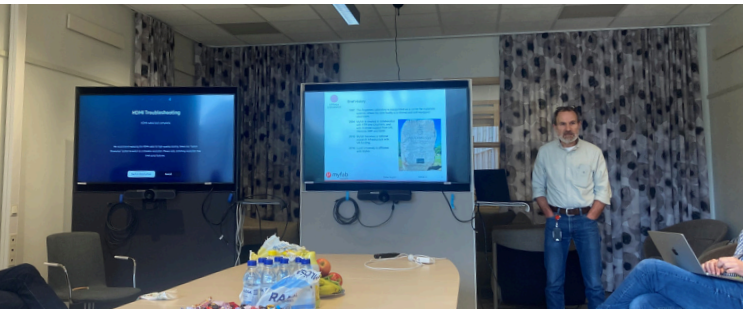
A key highlight of the first day was the consortium's visit to the Myfab Cleanroom at Ångström Laboratory.

The programme included a presentation on Myfab by Stefan Nygren. It was followed by a scientific presentation by Vassilios Kapaklis from the Department of Physics and Astronomy on the characterisation of epitaxial thin-film heterostructures using X-ray scattering techniques, and a guided visit to the cleanroom facilities.

The day concluded with a consortium dinner at Restaurant Granhof in Uppsala and a guided tour of the city afterwards.



Watch the [video](#) to learn more



Meet the partners:

Eastern Switzerland University of Applied Sciences (OST)



Image from <https://www.ost.ch>

The IMP Institute at OST Campus in Buchs focuses on educating engineers in photonics, microtechnology, materials sciences, and production metrology. Alongside its educational role, OST develops cutting-edge technological solutions meeting industrial standards.

With a team of 50 professors and highly skilled engineers, the institution ensures the highest professional standards in its research and development projects. Its integrative systems engineering approach & experience in collaborative, transdisciplinary projects ensure innovative and practical outcomes.

OST expertise covers:

- 1. Microtechnology:** From MEMS design to advanced packaging solutions, OST offers the complete micro-technical process chain in an ultra-modern clean room spanning 600 m².
- 2. Photonics:** The core competencies in photonics include laser-based manufacturing (SLE), fibre optics, optical system design and coating technology.
- 3. Materials science:** Specialists in metallurgy, damage analysis & materials selection consultation for metallic, polymer and composite materials.
- 4. Production metrology:** Expertise in tactile, optical and multisensory coordinate metrology, roughness metrology and geometric product specifications

In PIONEER, the OST micro-technology and photonics teams collaborate on membrane, acoustic substrate and packaging, in coordination with colleagues from Tindall.

Meet the OST team



Tobias Lamprecht
*Professor of Microtechnology;
Head of Institute for
Microtechnology and Photonics*



Markus Michler
*Professor for Physics
and Photonics;
Head of Competence
Centre Integrated Optics*



David Bischof
*Research Associate
Laser-Based Manufacturing*



Tina Strüning
*Research Associate
Optical Coatings*



Lodz University of Technology

The Lodz University of Technology (TUL) is one of Poland's leading technical universities, established in 1945.

It comprises nine faculties and employs over 2,700 academic and administrative staff, conducting advanced research and education across a range of engineering and applied science disciplines.

Optics, photonics and laser technology

The Faculty of Technical Physics, Information Technology and Applied Mathematics (FTIMS) hosts the Institute of Physics, which focuses on optics, photonics and laser technologies.

The institute specializes in the design, simulation and experimental characterization of photonic structures, laser systems and optical components. Its research combines theoretical modeling with precise laboratory measurements, supporting innovation in modern photonics.

Meet the partners:

Lodz University of Technology (TUL)



Image from <https://ftims.p.lodz.pl/>

Advanced optical detection

TUL's expertise in optical design, photonic measurements and laser-based technologies is directly relevant to PIONEER.

The university develops advanced optical detection methods and supports the creation of a laser-based microphone with a broader frequency response than standard acoustic sensors.

This work advances cutting-edge photonic technologies and their applications in science and industry.

Meet the TUL team



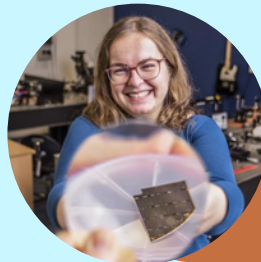
Tomasz Czyszanowski
Professor of Physics and Photonics; Head of TUL Photonics Group



Marcin Gębski
Head of the Laboratory at the Institute of Physics



Mikołaj Janczak
Research Specialist



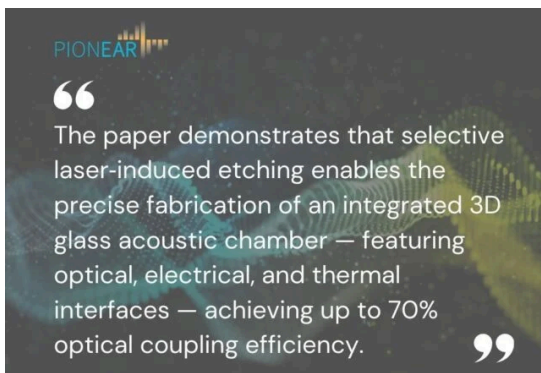
Magdalena Marciniak
Research Specialist

Outreach:

Project partner OST publishes PIONEAR's first peer-reviewed article

Laser micromachining of acoustic chambers for optical microphones

Our last newsletter reported on the [article](#) "Laser-based Manufacturing of an Acoustic Chamber for an optical microphone", which presents a laser-based manufacturing process for creating a miniaturized acoustic chamber made of glass. It was submitted to DGaO (German Society for Applied Optics) Proceedings by David Bischof, Marco Roth, Tina Strüning and Dr. Markus Michler.



We are now pleased to share that the article was published by De Gruyter Brill as a peer-reviewed publication in *tm – Technisches Messen*, leading journal bridging application-oriented measurement technology, sensors, systems and industrial measurement methods.



Article in *tm – Technisches Messen*.
DOI [10.1515/teme-2025-0111](https://doi.org/10.1515/teme-2025-0111).

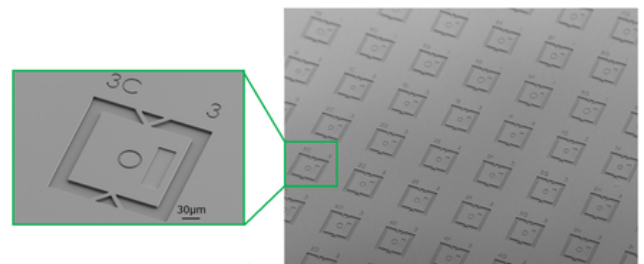
L-IMIF presented PIONEAR's progress at the world's largest optics and photonics technologies event

Presentations at Photonic West 2026

Our partner L-MIF, represented by Wioleta Ślaba, participated in the leading conference "Photonic West 2026". It is the world's largest optics and photonics technologies event, presenting research in biomedical optics, biophotonics, industrial lasers, optoelectronics, microfabrication, displays, quantum, and emerging vision technologies. L-IMIF showcased two presentations:

- **Technology of Electrically Pumped Vertical External Cavity Surface Emitting Lasers for Optical Microphone Applications**
- **Development of electrically pumped vertical external cavity surface-emitting lasers for optical microphone applications**

SPIE Photonics West 2026 offered an excellent opportunity to follow the latest advances in optics and photonics and to exchange ideas with researchers from both academia and industry.



www.pioneer-project.eu/news/

Events:

Upcoming events where PIONEAR partners will participate



VCSEL Day 2026

This annual meeting connects scientists and researchers from across Europe and beyond working with vertical-cavity surface-emitting lasers (VCSELs). The conference is attended by representatives from leading research institutions and universities and companies involved in VCSELs implementations.



DATE

Sep 11 2026



TIME

All Day



LOCATION

Ruhr University Bochum
Bochum, Germany



11th Workshop on Physics and Technology of Semiconductor Lasers

This focused, international and biennial workshop unites scientists, engineers, and industry experts from Poland and abroad. PIONEAR will be represented by its partners from the Lodz University of Technology (TUL): Magdalena Marciniak as conference chair and Tomasz Czystanowski in the scientific committee.



DATE

Oct 18 - 22 2026



TIME

All Day



LOCATION

Hotel Bulwar
Toruń, Poland

LPHYS'26

34th Annual International Laser Physics Conference (LPHYS'26)

LPHYS'26 brings together leading researchers, laboratories and institutions in laser physics.



DATE

Jul 06 - 10 2026



TIME

All Day



LOCATION

Costa Rica Marriott Hotel Hacienda Belén
Belén, Heredia, Costa Rica



3rd International Conference on Optics and Laser Technology (OPTICS 2026)

Optics 2026 follows the theme "Innovating Light: Transforming Vision and Technology."



DATE

Oct 29 - 30 2026



TIME

All Day



LOCATION

Holiday Inn Berlin Airport - Conference Centre
Berlin, Germany



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