



MILADO

Multiwavelength Laser for fast Diagnostic in
Biomedical and Manufacturing Applications

Revolutionizing Precision
Diagnostics with Advanced
Multispectral Laser
Technology for Biomedical
and Industrial Innovations

ISSUE 4

Newsletter

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Duration

36 Months

01/06/2024 -
31/05/2027



Consortium

7 Partners

4 countries



Budget

€ 4.9 Million

100% EU contribution

What happened in the last 6 months...

Technical F2F Meeting @ ADMIR, Moirans

The MILADO consortium met on 16–17 March 2026 in Moirans, France, for a technical face-to-face meeting hosted by ADMIR. Partners reviewed the current status of ongoing technical work, aligned upcoming integration and characterization activities, and discussed dependencies between fabrication, packaging,

demonstrator preparation and use-case implementation. The meeting provided an important opportunity to consolidate progress after the interim review and to prepare the next project phase with a shared technical roadmap.

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Ongoing technical progress in the current work packages

Following the successful completion of the first project period, MILADO has moved into a strongly implementation-oriented phase. Several technical work packages are now running in parallel, linking fabrication, characterization, packaging and demonstrator preparation more closely than before. The current focus is on turning the first design and process-flow results into functional components, test structures and use-case-specific demonstrator concepts.

WP4 remains at the core of MILADO's technology development, covering the fabrication of QC lasers on silicon as well as passive MIR-PICs. The first QCL generation at 9 μm has been completed and transferred to WP5 for further characterization, while the first QCL generation at 6 μm is approaching completion. In parallel, CEA-Leti finalized the MIR-PIC process-flow and fabrication report, including work on PIC bundles for both the 5.5–6.5 μm and 8–10 μm wavelength bands. Based on the experience gained from the first fabrication runs, the consortium has already started preparing and launching second-generation process flows for QCL and PIC devices, with the aim of improving device performance and supporting the next integration steps.

WP5 is advancing the transition from fabricated components to tested and packaged devices. The work includes wafer-level QCL characterization, chip-level PIC characterization, chip selection and preparation for module integration. Dedicated measurement benches have been

developed for QCLs and PIC bundles at both 6 μm and 9 μm , including work to assess optical losses and support reliable device comparison. In addition, specifications for QCL array geometries have been defined, and preparatory packaging activities have started through the procurement of HHL packages and thermoelectric coolers. These steps are essential for selecting suitable components and preparing them for integration into the MILADO demonstrators.

WP7 focuses on translating MILADO technologies into application-oriented demonstrators. ADMIR is developing a compact multi-QCL infrared illumination and scanning system for biopsy analysis, including the integration of pulsed laser driver concepts and acceptance criteria for high-quality infrared imaging. GAS has manufactured and assembled a new photoacoustic measurement cell, tested key sub-systems such as valves, heaters and temperature control, and validated the prototype through leak, temperature, acoustic noise and methane measurement tests. REC has further improved its laser-based setup for chemical process monitoring by upgrading the electronics, detector concept and optical interface, leading to an improved signal-to-noise ratio. sTHESIS is refining a reflection-mode optoacoustic sensor concept for non-invasive glucose sensing, with a particular focus on mid-infrared light transport and flexible integration of future MILADO QCLs.

WP8 continues to address one of MILADO's most ambitious long-term technology goals: the direct growth of III-V semiconductor

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materials on structured silicon substrates. CEA-Leti has delivered nano-patterned silicon wafers and is adapting the wafer design for the next batch based on feedback from the epitaxy work. Fraunhofer IAF is investigating InP growth in V-grooved Si trenches, including TEM analysis to assess the efficiency of aspect ratio trapping for crystalline defects.

InP/InGaAs marker-layer stacks are used to study how growth parameters such as III/V ratio, temperature and pressure influence the growth rates of different facets. These results are already supporting the design of the next structured wafer batch and provide an important basis for the future development of QCL heterostructures directly on silicon.

Recent dissemination activities

With the first project period completed and initial technical results becoming available, MILADO is now increasingly shifting its attention towards the dissemination of scientific and technological outcomes. The consortium has already started to present these results to relevant research and industry communities, while further publications are currently under preparation to build on the progress achieved in the first phase of the project.

First dissemination activities have already been completed. CEA-Leti contributed to the review paper "Pathway to versatile, point of care, and wearable photonics in the mid-infrared and fingerprint region based on quantum-cascade lasers and analytical

and computational advances", published in Optical Materials Express. REC presented the MILADO poster "Silicon-based MIR QCL-Arrays: Enabler for Low-Cost Inline Process Control" at EuroPACT 2026 in Lyon, highlighting the project's chemical process monitoring use case. In addition, Tom Meyer from Fraunhofer IAF gave an oral presentation related to MILADO at ICMOVPE XXII, focusing on growth parameters for high-quality InP growth in V-grooved Si trenches and the role of aspect ratio trapping. These activities mark the beginning of a more visible dissemination phase for MILADO, with further scientific papers currently being prepared by project partners.



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Upcoming Events

All past and upcoming events can be found on the MILADO official webpage:

<https://milado.eu/events/>

Project Facts

Consortium: 7 partners (4 countries)

Project Coordinator: Barbara Gaggl (Technikon)

Technical Leader: Marko Haertelt (Fraunhofer IAF)

Scientific Leader: Badhise Ben Bakir (CEA Leti)

Project number: 101070008

Project website: <https://milado.eu>

Project start: 1st June 2024

Project end: 31st May 2027

Duration: 36 Months

Total cost: EUR 4.943.399,27

EC contribution: EUR 4.943.399,27

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