



Laser Precision, Multispectral Diagnostic Revolution

MULTIWAVELENGTH LASER FOR FAST
DIAGNOSTIC IN BIOMEDICAL AND
MANUFACTURING APPLICATIONS



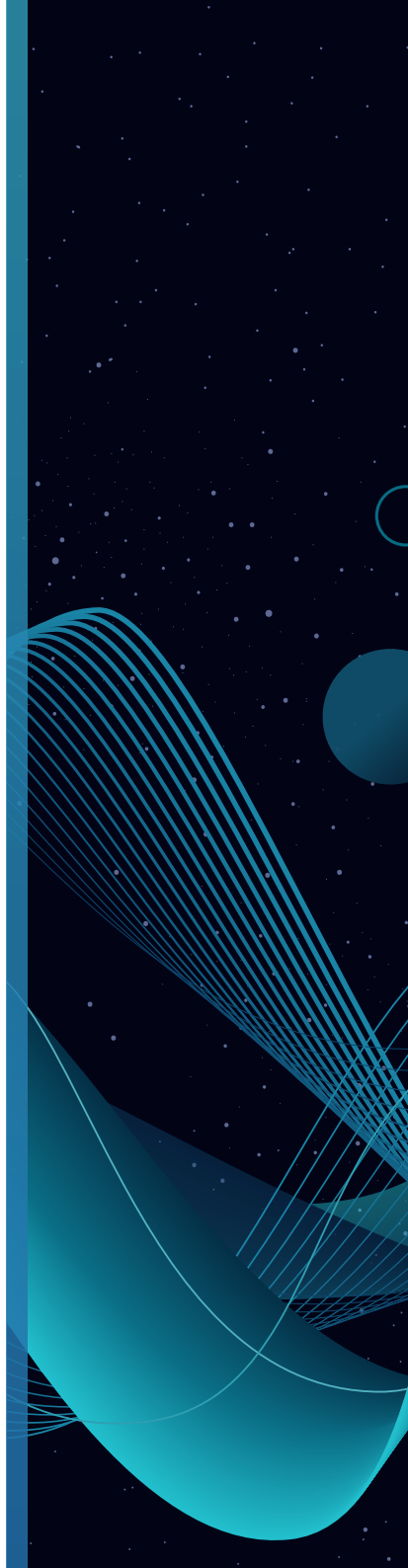
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About

The MILADO project aims to revolutionize mid-infrared (MIR) laser technology by developing cost-effective, high-volume manufacturing processes for Quantum Cascade Lasers (QCLs). These lasers are essential for various spectroscopic applications due to their compactness, high power spectral density, and broad spectral coverage up to 12 μm . However, their high costs limit market penetration. MILADO merges „group III-V“ and silicon photonics to create affordable, compact MIR light sources by using established complementary metal-oxide-semiconductor (CMOS) processes. This shift from expensive, complex craft production to scalable manufacturing could reduce QCL prices from thousands to tens of euros. Our innovation will revolutionize applications in bioanalysis, such as oncology, microbiology, and in detecting waste anaesthetic gases. Additionally, MILADO aims at replacing traditional assemblies with monolithic integration and serves as a fundamental building block of a general technology platform that also integrate sensors and actuators in micro-electromechanical systems (MEMS) technology. Our standardized approach will decrease costs, increase reproducibility, and benefit applications requiring miniaturized, portable, and robust MIR sensor solutions.





Vision

The MILADO project envisions revolutionizing the field of mid-infrared optical sensing by developing compact, economical light sources that unlock the powerful MIR region. By leveraging large-scale III-V epitaxy and cost-effective CMOS/MEMS fabrication, MILADO seeks to democratize access to advanced MIR sensor technology. This transformation will

enable innovative applications across various sectors, including biomedical diagnostics, industrial process control, and environmental monitoring. MILADO's ultimate goal is to make high-performance MIR sensor solutions more accessible, affordable, and versatile, paving the way for new markets and widespread adoption.



Motivation

The motivation behind MILADO is to address the limitations of current mid-infrared optical sensing technologies, which are often expensive and complex to produce.

MILADO aims at making MIR lasers low-cost and scalable for medical and industrial applications. By

enhancing QCLs on large substrates and integrating them with silicon photonics using CMOS technology, MILADO will replace expensive manufacturing methods. This innovative approach will allow access to markets that were previously out of reach and will open up new opportunities for impactful applications.



Mission & Objectives

The mission of MILADO is to develop and standardize small, affordable MIR laser sources. MILADO aims to transition from complex, costly production methods to high-volume, cost-effective manufacturing. This will enable sensitive and specific MIR sensors for a wide range of applications, including medical diagnostics,

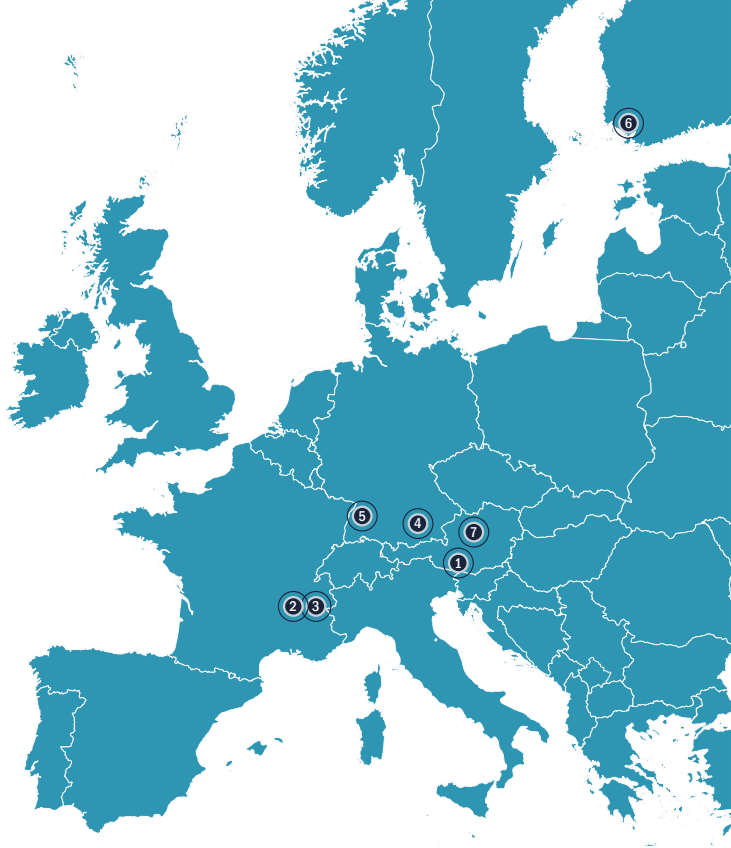
process control, and environmental sensing. By creating a versatile, scalable platform that integrates new functionalities, MILADO is committed to driving advancements in miniaturized, robust, and portable mid-infrared sensor solutions, opening new markets previously inaccessible due to high costs and complexity.

MILADO project at a glance

- Develop large scale III-V epitaxy for low-cost manufacturing of QCLs.
- Enable economical, high-volume fabrication of a universal MIR photonic integrated platform.
- Prototype novel sensors for personal medical diagnostics or edge-sensors in chemical production opening new markets.
- Demonstrate process control and medical diagnostics from MIR chemical imaging histopathology to non-invasive continuous glucose monitoring.
- Accelerate the analysis time in infrared spectral histopathology by 100 times.

Partners

The MILADO consortium consists of 7 highly qualified business and applied research partners from four different countries (France, Germany, Austria and Finland) who combine the know-how that is necessary to implement the project.



1

TECHNIKON

Technikon Forschungs- und Planungsgesellschaft mbH
Austria [Villach]

2

ADMIR

ADMIR, Active Digital Multi-spectral InfraRed
France [Moirans]

4



sTHESIS
Germany [Munich]

6



Gasera OY (GAS)
Finland [Turku]

3



CEA-Leti is a technology research institute at Commissariat à l'énergie atomique et aux énergies alternatives France [Grenoble]

5



Fraunhofer Gesellschaft zur Förderung der angewandten Forschung EV
Germany [Freiburg]

7



RECENDT - Research Center for Non-Destructive Testing GmbH, Austria [Linz]

Facts



Budget

€ 4.9 Million
100% EU-funded



Consortium

7 Partners
4 Countries



Duration

36 Months
06/2024 - 05/2027

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CEA-Leti is a technology re-
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Find out more
about this Project:

<https://milado.eu/>

