Newsletter

BROMEDIR Project — https://bromedir.eu/

Broadband MEMS-based InfraRed spectrometers: The core of a multipurpose spectral sensing photonic platform

BROMEDIR Introduction

The project aims to innovate by developing a new generation of miniaturized FTIR (Fourier Transform Infrared) and PTS (Photothermal) spectrometers for liquid and gas sensing applications respectively. In addition, a new cloud-based platform will be developed for enabling advanced data analytics. Therefore, the overall system approach intends also to achieve faster data analysis, with results easily accessed from anywhere by the end-user.

Project Objectives

- Develop the novel FTIR and PTS spectrometers
- Develop the new integrated and flexible platforms
- Tests and validations of the innovations developed
- Wide-scale but also audience-specific communications to demonstrate the results and overall value to all stakeholders

Vol. 03
M12-M24

● Newsletter ●

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

PROJECT WORK COMPLETED

TECHNICAL UPDATES UP TO PROJECT MONTH 24

BROMEDIR USE CASES

The 3 use cases of the project are:

1) Hydrogen supply chain
2) Fuel quality control
3) Milk quality control

Featured in Newsletter Vol. 01

SUMMARY OF WORK COMPLETED UP TO MONTH 12

- User & stakeholders requirements
- Validation scenarios
- System requirements & conceptual designs
- System Architecture Skeleton completed
- First versions of Interferometer structures designed
- First versions of Mid-IR photodetectors and light sources delivered

TECHNICAL PROGRESS FROM M12 TO M24

PHOTONIC INTEGRATED CIRCUITS FOR FTIR & PTS

This work relates to the fabrication of the first version (v1) of two distinct Photonic Integrated Circuits (PICs) embedding the optical interferometers as the core elements for both Photo Thermal Spectroscopy (PTS) and Fourier-Transform Infra Red (FTIR) spectroscopy, respectively.

INTEGRATED FTIR SPECTROMETERS

As part of this work, the first version of the FTIR spectrometer was integrated with multiple components, including the Photonics Integrated Circuits (PICs), the new developed Mid InfraRed (MIR) photodetectors, the optimized light source and the mesoporous layer on Attenuated Total Reflectance (ATR) crystal.

INTEGRATED PTS SPECTROMETER

This work included the integration of the fabricated PICs with the optimized laser sources. The performance of the PTS sensor was evaluated by investigating the balanced-detection ICAPS (Interferometric Cavity-Assisted Photothermal Spectroscopy) scheme by setting up a sensor system with separate optical cavities and fiber-coupled optics.

VALIDATION PROTOCOLS

Detailed protocols were designed for the validation of all three versions of the integrated devices. The protocols cover in detail aspects such as a) sampling procedures, b) sample storage and shipping methods/conditions, c) standards for validations, and d) plan for conventional lab analysis & instruments.

DATA ANALYTICS PLATFORM

This work outlines the first version of the BROMEDIR data analytics platform. It details the methodology followed for its development as well as analysis of existing tools and methods. The platform overall schematics were designed, including its internal structure and interactions with interconnected components.

WHAT'S NEXT..

- Second versions of all components
- Fully optimised second versions of integrated FTIR & PTS prototypes
- Progress in laboratory tests
- Initiation of BROMEDIR technologies validations within the 3 use cases

To be featured in next Newsletter Vol. 04

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

PROJECT WORK COMPLETED

TECHNICAL UPDATES UP TO PROJECT MONTH 24

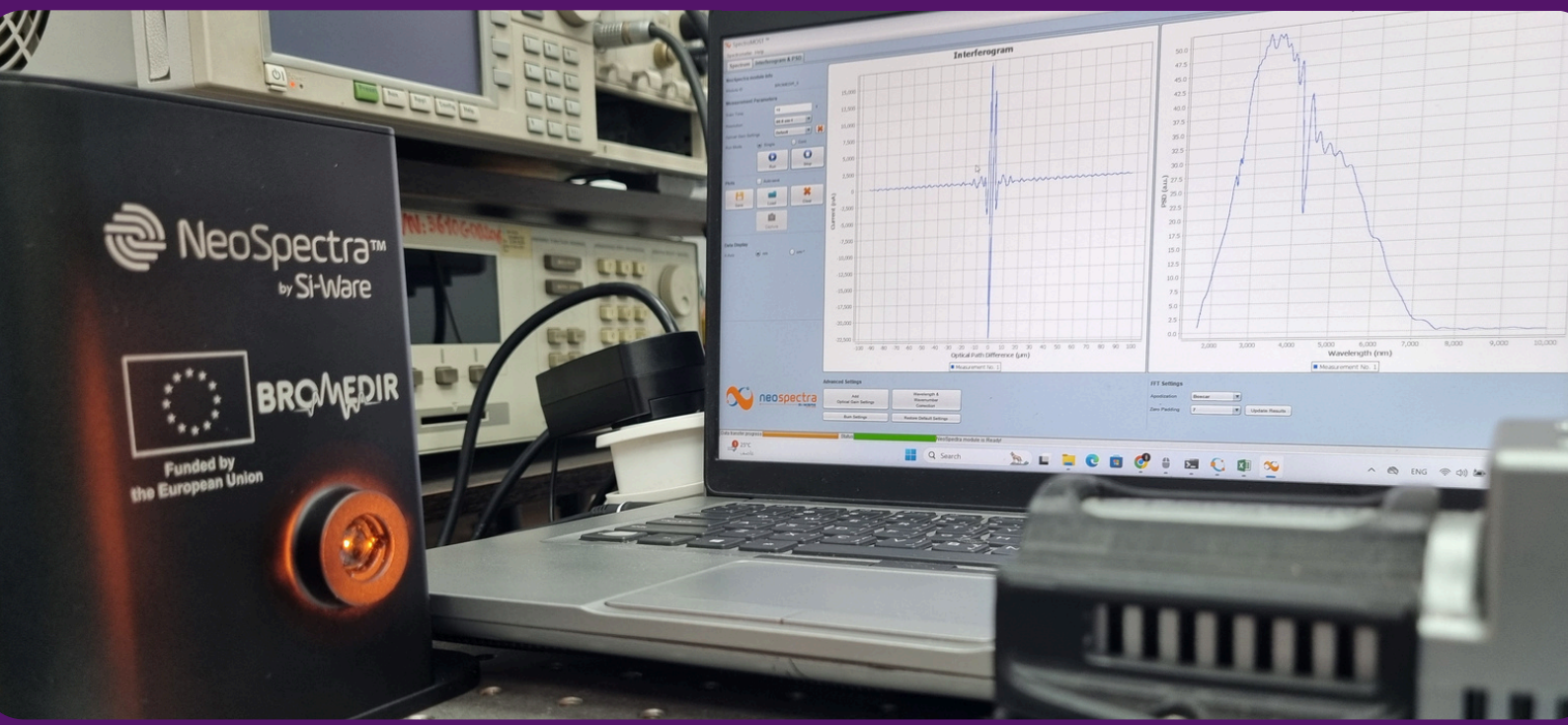
INTEGRATED PROTOTYPES

The focus of this work was the initial integration activities for the three BROMEDIR systems:

- Hydrogen quality control PTS System,
- Fuel quality control FTIR System, and
- Milk analysis FTIR System.

These were built upon the System Architecture Skeleton (SAS) and integration roadmap defined previously.

Several essential subsystems are now operational and already progressed for full integration. This work outlines the development and testing of these sub-modules, including the main processing and control units, power modules, sample delivery mechanisms, user interfaces, and temperature control systems.



Funded by the European Union

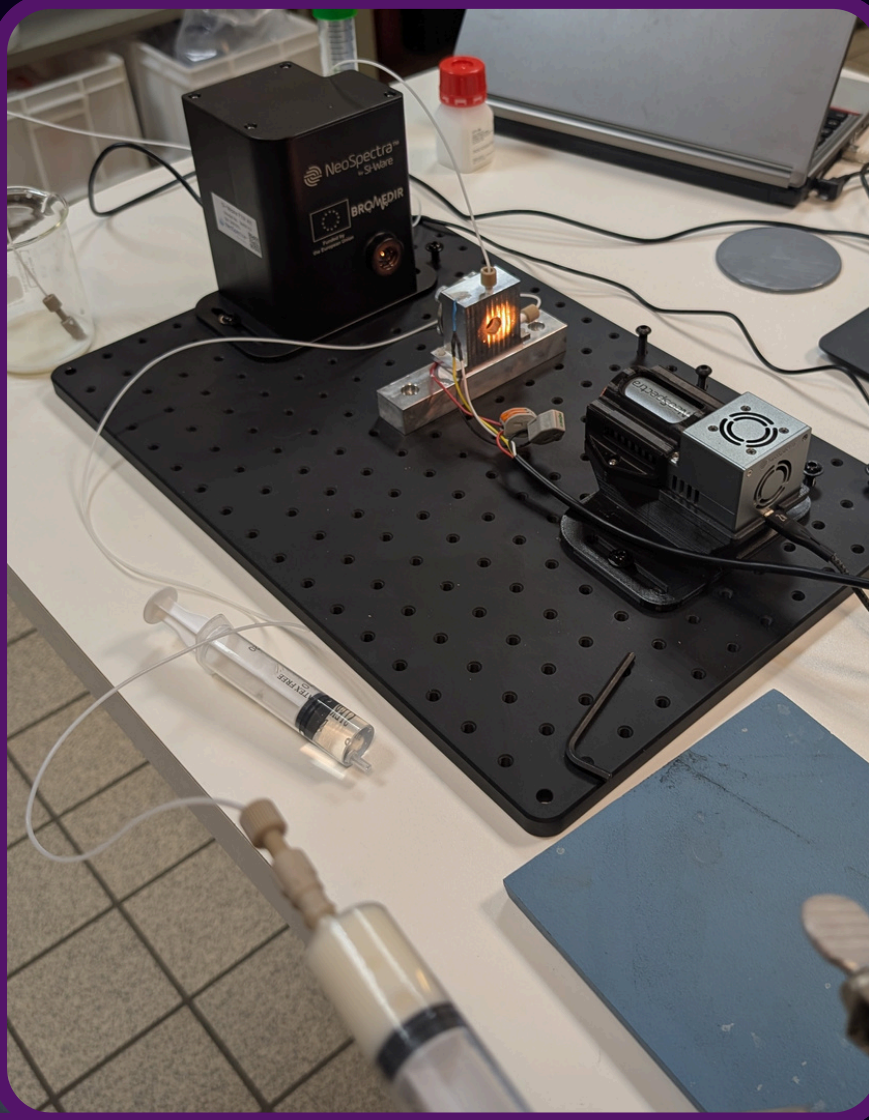
Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

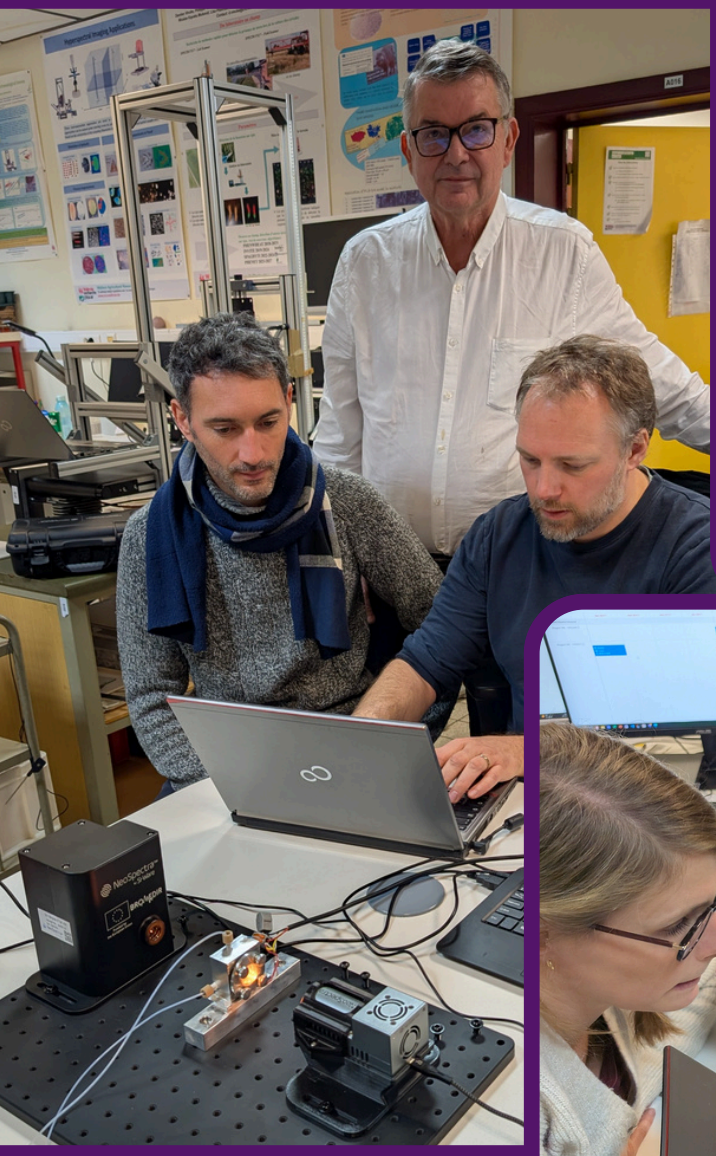
PROJECT WORK COMPLETED

TECHNICAL UPDATES UP TO PROJECT MONTH 24

INITIAL LAB TESTS

The first version of the integrated FTIR prototype for milk analysis was tested at CRA-W where colleagues from both project partners CRA-W and SENSEEN performed the first laboratory tests of the system as part of the Milk quality use case. Sample preparation and milk analysis were tested to proceed with further optimisations of the prototype.





Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

DISSEMINATION & COMMUNICATION

NEWS FROM BROMEDIR CONSORTIUM MEETINGS

The Consortium meets regularly via online meetings where partners can share updates, discuss issues, and results. In addition, BROMEDIR holds in-person meetings every six months with an opportunity for a different partner each time to host the event.

>>> M18 MEETING - JUNE 2024

A two-day meeting was hosted by project partner VIGO Photonics in Warsaw, Poland which included presentations on work performed, technical updates, discussions on various project matters, lab visits and informal catching up between colleagues from all partners.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

DISSEMINATION & COMMUNICATION

EVENTS ATTENDED DURING THE LAST 12 MONTHS

ACHEMA 2024

BROMEDIR was communicated via poster presentation and leaflet dissemination by project partner TUW at ACHEMA 2024 in Frankfurt, Germany.

PHOTONICS PARTNERSHIP ANNUAL MEETING 2024

BROMEDIR was also featured by CyRIC at the Photonics Partnership Annual Meeting 2024 in Brussels, Belgium. Leaflets were disseminated at the 2024 event. At the annual meeting in 2023, the project was presented with a keynote at the main stage of the event.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

DISSEMINATION & COMMUNICATION

EVENTS ATTENDED DURING THE LAST 12 MONTHS

>>> SPIE PHOTONICS EUROPE 2024

BROMEDIR was communicated at the SPIE Photonics Europe 2024 held in Strasbourg, France with leaflet dissemination at the exhibition area by partners CyRIC and NPLUS.

>>> 2024 INTERNATIONAL CONFERENCE ON MICROELECTRONICS (IEEE-ICM)

BROMEDIR was presented with scientific conference paper submitted and accepted for keynote presentation titled “Mid-Infrared Wavelength-Selective Absorbing Metasurfaces Based on Highly-Doped Silicon Gratings” and presented by Dr. Kirollos Ernest from project partners SIWARE & UGE at IEEE-ICM 2024, Doha, Qatar.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

DISSEMINATION & COMMUNICATION

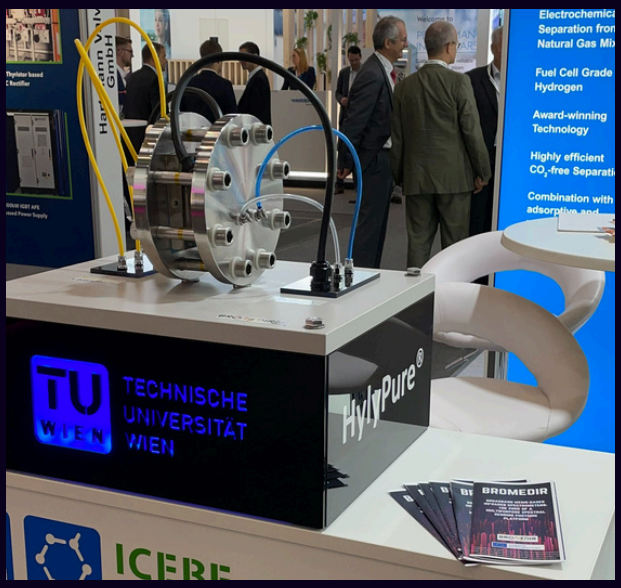
EVENTS ATTENDED DURING THE LAST 12 MONTHS

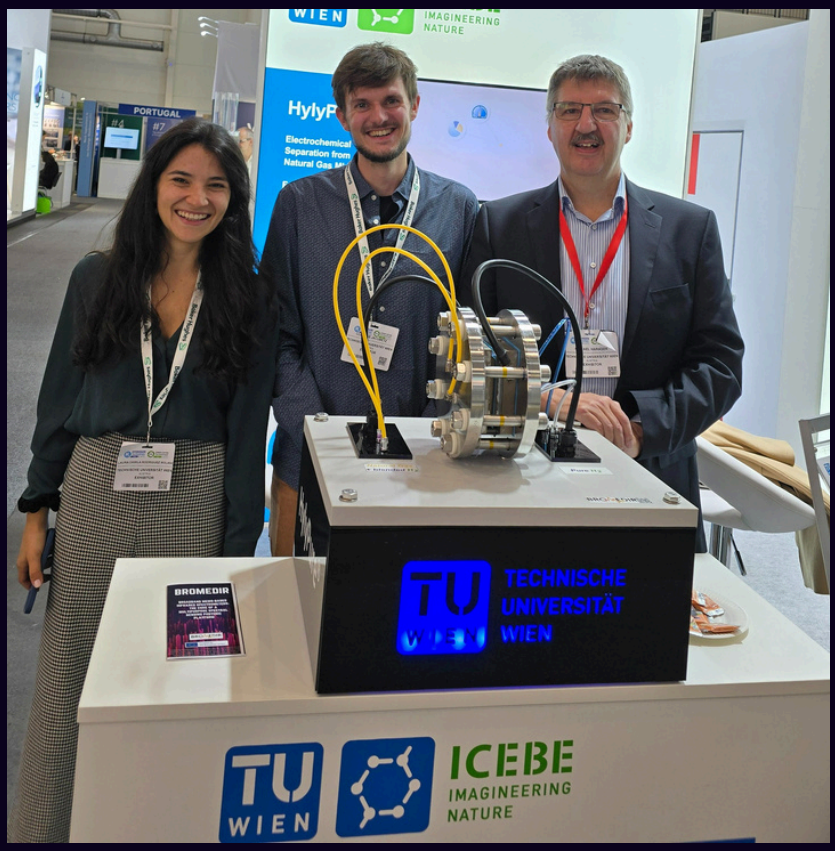
>>> HY-FCELL 2024

BROMEDIR was also featured at the hy-fcell 2024 held in Stuttgart, Germany with poster presentation and leaflet dissemination by Prof. M. Harasek group from project partner TUW.

>>> HYDROGEN TECHNOLOGY EXPO EUROPE 2024

BROMEDIR was also featured at the Hydrogen Technology Expo Europe 2024 with booth presentation of BROMEDIR technologies and leaflet dissemination by Prof. M. Harasek group from project partner TUW.





Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

DISSEMINATION & COMMUNICATION

CLUSTERING ACTIVITIES

>>> BROMEDIR JOINS ECREAM CLUSTER

In November 2024, BROMEDIR project officially joined ECREAM, the European Cluster of Research projects for Environmental and Agri-food Monitoring. The network facilitates the sharing of knowledge between mainly photonics-based research projects funded under various EU Horizon 2020 and Horizon Europe research and innovation programme and further coordinates joint communication and dissemination activities. Most of the projects are also part of the Photonics21 Public Private Partnership.

This exciting new collaboration was communicated on both BROMEDIR and ECREAM websites and social media. The first meeting took place online early in Dec. 2024. Representatives from all projects discussed common activities to jointly participate in 2025.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.

BROMEDIR CONTACT DETAILS

ONLINE PRESENCE OF THE PROJECT

PROJECT NEWSLETTER

The newsletter aims for a quick overview of project updates, news, work performed and events attended throughout the project duration. Anyone interested in BROMEDIR project, may conveniently subscribe via the project website to receive an automated notification once a newsletter is released.

BROMEDIR

LET'S STAY CONNECTED

CONTACT DETAILS

Website: https://bromedir.eu/

Email: info@bromedir.eu

BROMEDIR ON SOCIAL MEDIA

https://www.linkedin.com/company/bromedir/

https://www.facebook.com/bromedir

https://www.youtube.com/@BROMEDIR

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HADEA. Neither the European Union nor the granting authority can be held responsible for them.