

**Project:**

Novel MidIR-Analyzer for blood diagnostics (MIR-lyzer)

Technological key words:

POCT, MIR-spectroscopy, blood testing

Industrial sectors addressed:

Healthcare, Test equipment manufacturer

Total project costs:

2.1 Mio. Euros

Partners' descriptions:

- **Siemens AG-Corporate Technology (SIE)** (D) is the central R&D-department of Siemens to secure the future technology and competitiveness of the company. Based on a large know-how in sensor technologies and their transfer into functional devices, SIE will develop multivariate data-analysis algorithms for blood markers and finally implement the new spectrometer of PYR into a working demonstrator device for point-of-care-testing (POCT) of blood samples. SIE will also coordinate this project.
- The key competence of **Pyreos Ltd. (PYR)** (GB) is the manufacturing of piezoelectric sensors suitable e.g. for mid-infrared spectroscopy application. Around this, PYR has developed a novel fully mid-infrared (MIR) spectrometer system for mainly industrial applications such as oil analysis. PYR will bring its existing knowledge into this project to further develop and optimize the sensor technology as well as the spectrometer system to meet the requirements for testing of small volume blood samples.
- **The university hospital "Klinikum rechts der Isar" (MRI)** (D) serves its patients with a highly skilled team of dedicated doctors, nurses, research scientists, and technical assistants. The "Klinikum rechts der Isar" is part of the TU München. In this project, MRI will collect blood samples from patients with defined diagnosis and will also compare test results between the POCT-device and the central laboratory methods. This procedure should evaluate the suitability of the developed demonstrator for the clinical use.





Project abstract:

The key objective of MIR-lyzer is the development of a pre-commercial demonstrator for rapid POCT blood diagnostics using a novel low-cost approach which is based on mid-infrared (MIR) spectroscopy. The proposed system will accurately detect critical markers in blood samples of low volume in real time. It is aimed to provide accurate analyses for sample volumes as low as 10 μ l.

Laboratory blood analysis plays a pivotal role in the diagnosis of diseases. Currently the results from blood analysis are used in more than 50 % of all illnesses to support the correct clinical diagnosis. Today, an affordable and competent system of laboratory diagnostics, both in the inpatient and outpatient areas, has been made possible through centralization of analysis in high-throughput laboratories or in the facilities provided by large hospitals. In contrast to this centralization and increased efficiency in laboratory diagnostics, there is a novel trend towards a more decentralized diagnostic analysis, so-called point of care testing, or POCT, which occurs directly at the patient bed, in the operating theatre, in the outpatient clinic or at the sites of accidents. This modern version of laboratory medicine is characterized by device miniaturization and the increasing use of modern information technology. There are analytical laboratory devices which enable processing of a whole blood sample in a simple manner, allowing also untrained staff to carry out laboratory diagnostics. It is clear that the use of POCT at this point can provide shortening of the time between sample acquisition and analysis. However, this type of test is only useful if the results can be relied on to support an immediate diagnosis or therapy.

For the project, five key markers in blood samples and two markers in urine were selected, if accurately detected with the MIR-lyzer, have the largest medical and commercial impact. The project will therefore focus on the reliable and accurate detection of these markers. The demonstrator setup will be tested at the clinic. It is imperative to check the accuracy of the measured analytes with respect to cross-talk from different medications to ensure their significance. Subsequently, the capability of the system will be extended to include additional marker substances to add further capability to the proposed blood monitoring system.



Participating Countries & Regions



CATALONIA



FLANDERS



GERMANY



ISRAEL



LATVIA



TUSCANY



UNITED KINGDOM

Expected results and exploitation plan:

- The Diagnostics division of Siemens Healthcare enables expansion of its position in the high-growth point-of-care diagnostics market and satisfying the growing need in personalized health care. The novel POCT diagnostics system addressed in the project supports clearly the target of Siemens Healthcare to provide novel and smart solutions.
- For PYR, the project offers the chance to qualify their novel MIR-spectrometer for healthcare applications. By partnering with SIE, PYR has the chance to gain a foothold in the medical market as a component supplier to Siemens Healthcare.
- Spectroscopy as novel POCT-approach to minute samples is of great interest for MRI and shall be introduced to the clinical daily routine. Given the potential impact in terms of cost saving and enhancement of therapeutic treatments, MRI expects great positive publicity for the POCT system in the clinic.

