PHOTONFOOD

Flexible mid-infrared photonic solutions
for rapid farm-to-fork sensing of food contaminants

H2020-ICT-2020-2
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Deliverable D7.5

Live demonstrations

WP7 – Communication, dissemination and exploitation

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Abbreviations

HI-FI	High-fidelity data device
MI-FI	Mid-fidelity data device
MIR	Mid infrared

Partner Short Names

NANOPLUS	nanoplus Advanced Photonics Gerbrunn GmbH
UULM	Universität Ulm, Germany
NMBU	Norwegian University of Life Sciences
BOKU	Universitaet fuer Bodenkultur, Wien
WU	Wageningen University

Executive summary

Objectives
PHOTONFOOD objectives
The PHOTONFOOD project aims to develop and demonstrate in real settings a flexible mid-infrared photonic solution for the detection of microbial and chemical contaminations based on innovative photonic devices, paper-based sample handling and advanced data mining solutions. The aim of Work Package (WP) 7 – Communication, dissemination and exploitation, is to support this through suitable activities targeted at the main stakeholders.
Deliverable D7.5 objectives
The communication and dissemination activities aim to present the PHOTONFOOD project and its results to specific relevant target audiences and the general public. The strategy of all PHOTONFOOD dissemination and communication activities was defined in a Communication and Dissemination Plan which describes how the activities will be implemented and evaluated to assure maximum impact on the project's target audiences. This deliverable (D7.5) is intended to report on the live demonstrations of the PHOTONFOOD platform. This includes both, the activities already carried out and those still planned.
Implementation
Current status
This report presents the progress of the live demonstration up to the end of June 2024 and provides an outlook on planned activities. Additionally, it outlines the upcoming events for future demonstrations of the PHOTONFOOD platform.
Next steps
The next steps consist of the planned activities, as listed in this report.

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1 Finished and planned activities

This deliverable (D7.5) is structured into two parts: First, it reports on the already finished activities, where the PHOTONFOOD hardware was shown to the public, to stakeholders, or to other interested parties. Second, it looks ahead and summarizes all the events that are going to be held and that have not yet happened. Table 1 provides an overview of all the activities planned to date, the first four of which have already taken place and are reported on in the following chapters.

Table 1. List of the activities related to deliverable 7.5.

Time	Event	Location	Stakeholders
7th to 11th April 2024	SPIE Photonics Europe	Strasbourg, France	Scientific community, Technology providers
15th to 26th April 2024	Young researchers at Wageningen University	Wageningen, Netherlands	Scientific community,
19th June 2024	Demonstration at Seeberger	Ulm, Germany	Companies along food value chain
20th June 2024	BioSpec summer school (NMBU)	Ås, Norway	Scientific community
June 2024	Local mill	Norway	Companies along food value chain
October 2024	NEBIH	Budapest, Hungary	Relevant authorities
27th & 28th Nov. 2024	PHOTONFOOD, Final Symposium	Tulln, Austria	Scientific community,

2 SPIE Photonics Europe

The SPIE Photonics Europe 2024, held in Strasbourg in April, was a prestigious gathering that brought together professionals, researchers, and industry leaders from the field of photonics. More than 100 companies and industry groups exhibited. This event, known for its focus on the latest advancements in photonics and optical technologies, provided a platform for knowledge exchange, networking, and showcasing innovative solutions. Our team participated in the SPIE Photonics Europe 2024 by showcasing our work at the ECREAM booth (Fig. 1). The event was a perfect opportunity to raise awareness of our project and engage with the photonics community.

Figure 1: Demonstration of the PHOTONFOOD hardware at the SPIE Photonics Europe in Strasbourg. PHOTONFOOD was part of the ECREAM booth (left). The visual presentations and live measurements helped to effectively communicate the potential and versatility of the PHOTONFOOD hardware (right).

We presented our two optical sensor systems, which attracted significant attention from the attendees, highlighting the innovative nature and potential applications of our devices. The HI-FI and MI-FI prototypes garnered high attention at the ECREAM booth, with over 120 enthusiastic attendees expressing keen interest. During the exhibition, we engaged in numerous discussions with visitors, who ranged from academic researchers to industry professionals. The interactive demonstrations of our optical sensor systems facilitated in-depth conversations about the technology's capabilities, potential uses, and future developments. The feedback received was overwhelmingly positive, with many expressing interest in our technology, and leading to technical conversations and fruitful discussions. Our participation in SPIE Photonics Europe 2024 was a successful endeavor that allowed us to showcase our innovative optical sensor systems to a discerning and knowledgeable audience. The event facilitated valuable discussions

and provided opportunities for future collaborations, reinforcing our commitment to advancing photonic technologies.

3 Wageningen

The meeting of young researchers at Wageningen University provided a dynamic platform for hands-on experimentation and collaborative discussion focused on the full PHOTONFOOD workflow. During two weeks, this meeting brought together young researchers from PHOTONFOOD (UULM, NMBU, BOKU and WU) to train on the developed sample processing and analysis workflow of WU and to integrate this workflow with the sensor systems. During integration, researchers conducted a series of experiments aimed at analyzing DON both in solution and on paper microfluidic substrates, using the MI-FI and HI-FI sensor system. The meeting at Wageningen University was a successful event that facilitated significant advancements in the application of our MI-FI and HI-FI sensor systems for DON detection. The hands-on experiments and collaborative discussions not only evaluated the effectiveness of our technologies but also provided valuable insights for future enhancements. The interactions formed the basis for discussions between the young researchers and brought our sensor technology closer to a wide audience.

Additionally, during an afternoon session, the researchers of PHOTONFOOD demonstrated the latest developments of the full workflow to a relevant stakeholder (Fig. 2). Three representatives from the European Union Reference Laboratory (EURL) for mycotoxins and plant toxins, located at WU, attended the demonstrations and provided feedback through multiple surveys and valuable discussions. This feedback, together with feedback from other demonstration sessions, will be used to guide ongoing and future developments, to optimize end-user satisfaction.

Figure 2: Presentation of the sample processing procedure during the young researchers workshop at Wageningen University.

4 Seeberger

Our team visited Seeberger, a renowned company based in Ulm and PHOTONFOOD partner, to demonstrate our advanced sensor system (Fig. 3). Seeberger is a leading company specializing in the processing and distribution of nuts, dried fruits, and coffee. Known for their commitment to quality and innovation, Seeberger maintains rigorous standards in their production processes to ensure the highest product quality and has provided input to the development of the PHOTONFOOD devices from the beginning, including the potential use cases and size requirements. The demonstration took place in one of Seeberger's state-of-the-art laboratories, providing an ideal environment to showcase the capabilities of our technology.

Fig. 3: The PHOTONFOOD hardware (black housing) was shown and tested in the laboratories of the Seeberger facility in Ulm. This was a joint effort by the team from UULM and employees from Seeberger.

During the visit, we demonstrated the functionality of our sensor system, highlighting its potential applications in quality control and process optimization. The Seeberger team engaged with the demonstration, asking insightful questions and discussing potential uses for our technology. The visit to Seeberger was a valuable opportunity to demonstrate our sensor system's capabilities in a real-world setting and discuss potential applications with a leading industry player. The quality control team at Seeberger provided valuable feedback through a detailed survey, offering insights that are crucial for refining our technology.

5 NMBU summer school

The BioSpec's interdisciplinary Summer School on mining of biospectroscopy data 2024, NMBU, Norway (BioSpec Summer School) was supported through outreach activities by PHOTONFOOD. The BioSpec Summer School 2024 was organized for physical and digital participation. This interdisciplinary event, organized by the Norwegian University of Life Sciences, brought together Master's and PhD students, Postdocs and researchers from various fields to work on complex research problems. During the BioSpec Summer School, we presented our sensor platforms (Fig. 4), MI-FI and HI-FI, to the in total 35 participants from different universities around Europe and the USA. The demonstration highlighted the practical applications of our sensor systems in analyzing reference samples. Engaging discussions with the students followed, wherein they posed insightful questions and explored potential applications of the technology in their own research. Our demonstration in the BioSpec Summer School was a good opportunity to bring our sensor technology to an enthusiastic and knowledgeable audience.

Fig. 4: The PHOTONFOOD sensor platforms were shown and tested in the laboratory at NMBU during the BioSpec Summer School 2024.

6 Summary and outlook

Our team has successfully demonstrated the PHOTONFOOD devices together with the developed software in four key events to date. At SPIE Photonics Europe 2024 in Strasbourg, we showcased two optical sensor systems at the ECREAM booth, engaging with a knowledgeable audience about potential applications and collaborations. At Wageningen University, young researchers used our MI-FI and HI-FI systems to analyze Deoxynivalenol (DON), leading to valuable insights and discussions. During our visit to Seeberger in Ulm, we demonstrated our sensor system in their lab, receiving positive feedback and exploring potential applications. At the BioSpec Summer School 2024 (NMBU), we presented our sensor platforms to students and generated discussion and feedback on new research applications.

Looking ahead, we plan to demonstrate our sensor platforms at several upcoming events. These include a live demonstration at a mill in Norway to showcase the sensor systems' capabilities in an industrial setting, a presentation at NEBIH, the National Food Chain Safety Office in Hungary, to highlight applications in food safety and quality control, and a comprehensive demonstration at the final symposium of the project,

summarizing our achievements and discussing future directions. These events offer further opportunities to exchange ideas with experts from the industry, explore new applications and promote cooperation.