Interreg
EUROPEAN UNION
North-West Europe
Quality Control of fresh Agro Products
European Regional Development Fund

NEWS
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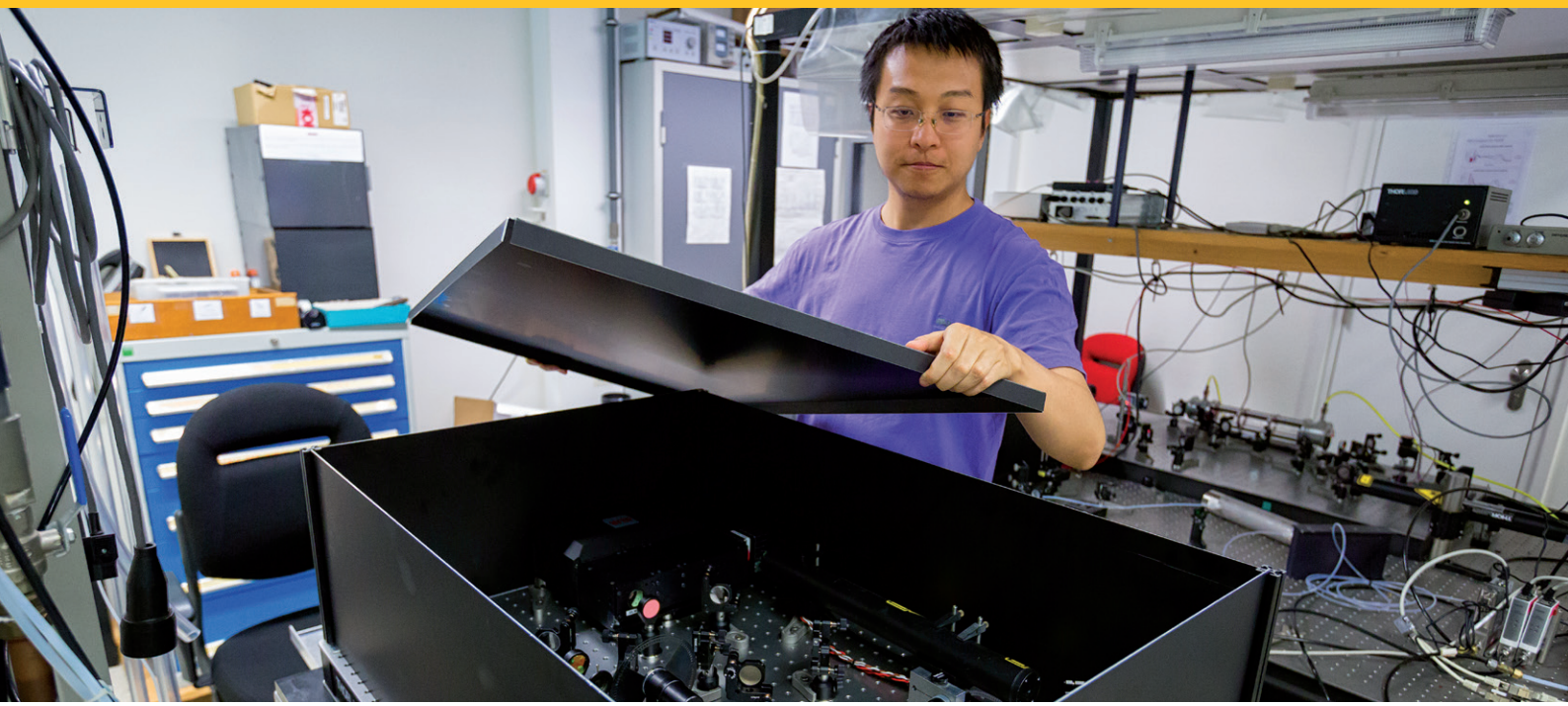


QCAP detector assembly in full swing at Radboud University

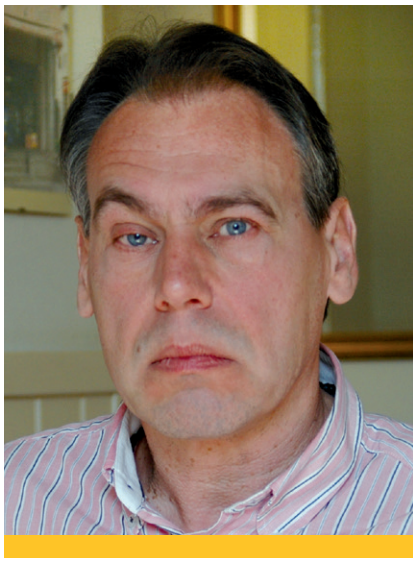
Over the past months the trace gas research group at Radboud University has built a mobile gas sensor system that intends to sample directly from the storage rooms. Their challenge is to get it operational 24/7 under industrial conditions.

The laser-based sensor is placed in a shielded, temperature-controlled unit and will be completely autonomous. Once operational, the storage rooms will be regularly sampled, by sucking gas samples from the rooms via tubes to the detector. There, the gas samples will be checked for trace gases, representing spoilage, fermentation and ripening of the produce.

Every 10 minutes another room will be sampled. The results will be sent via the WIFI system to the operator.

Recently, the group have succeeded in getting a lab-based system operational, detecting gases and identifying related gases. But to be able to detect reductions in fruit quality at an early stage, improvements still have to be made in specificity and sensitivity. Meanwhile, the sensor system is incorporated into a complete mobile detector (see picture). If all goes well, the first trials with this prototype will take place by the end of 2018 at the Flanders Centre of Postharvest Technology in Leuven.

Collaboration with Wageningen essential for the best possible data interpretation in practice



Ernst Woltering

The Wageningen Food & Biobased Research institute has more than 25 years of experience in developing interactive storage systems for fruit and vegetables. These systems often work with parameters such as temperature, humidity, oxygen and carbon dioxide. There is a great need to monitor other gases as well, for example those that indicate decay or fermentation. That is why researcher Ernst Woltering is happy to participate in the QCAP project as an associate partner. Here, he explains his role and points out what the QCAP detector could mean for the fruit and vegetable sector.

"The QCAP detector provides a wealth of information to farmers, making it possible to significantly reduce their food waste"

How did you get involved in the project?

"Previously, we collaborated with the major players in the field of storage systems, such as Storex. We also already worked on several projects with Frans Harren of Radboud University in Nijmegen, the project leader of QCAP. He has the physical knowledge that is needed to build and optimise the gas detector. This project is therefore a logical next step in a sustainable collaboration."

What do you contribute to the QCAP project?

"Within our institute there is a lot of knowledge of the biochemical processes in fruit and vegetables. We use this expertise to determine which gases provide the most information on the quality, but also to determine when there is a relevant change in the mixture of gases. For example, what does it mean if a certain gas concentration rises by 10%? Does the atmosphere in the storage space need to be adjusted, or does the product need to be sold? We have to determine this for each type of product."

What makes QCAP so innovative?

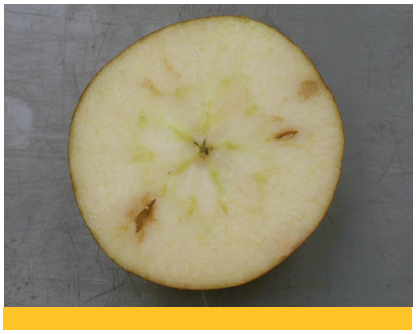
"QCAP is developing a user-friendly device to detect gases that, at present, are only measurable in a research setting. What is particularly important is that the new detector makes it possible to monitor all these gases with one device in a completely automatic process. This will make a large amount of data available, resulting in much more accurate quality measurements. Ultimately, this leads to less food being wasted."

Which characteristics should the new monitoring system have?

"The detector must be useable in practice. That sounds simple, but the practice is very diverse which includes dealing with different products, orchards, harvests, geographical locations and storage areas. Sometimes one room contains multiple products or harvests. That is why we need to work on a self-learning software package that can adapt the monitoring to any situation. If we succeed, QCAP can have a significant impact on the fruit and vegetable sector."

First apple and blueberry measurements in Jork, Germany

Internal browing in the apple variety Braeburn



Cavities in Braeburn

The 'Altes Land' is the biggest closed fruit growing area in Northern Europe. On about 10 000 hectares mostly pome and stone fruit is produced. The main cultivar are apples, with a harvest volume of more than three million tons.

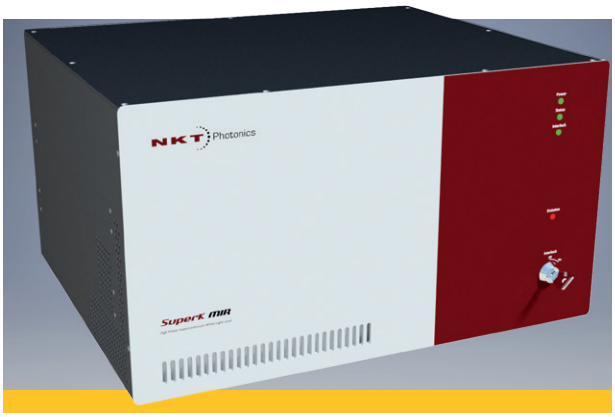
The Esteburg research station in Jork belongs to the chamber of agriculture and is the central contact point for tree fruit research in northern Germany. Their department of fruit storage and fruit quality is in charge of the storage experiments of apples and blueberries in the QCAP project. There is a direct link to the farmers via the Fruit Advisory Service of the Altes Land (OVR) which consults fruit farms in the region and nationwide.

The first blueberry storage season for the QCAP project was finished in November 2017, while the apple storage trials lasted until May 2018. The fruit was tested for the firmness and the sugar and acid contents. In addition, the substances acetaldehyde, ethylacetat and ethanol in the fruit juice were measured with the gas chromatograph. The air samples of the storage rooms were sent to the project partner Cranfield University in England, for further analysis of the volatile compounds. In this way, the project partners can together identify the relation between the gases released by the fruits and various degradation processes that influence the fruit quality.

In the next storage season, Esteburg will experiment with the oxygen and carbon dioxide levels in the storage rooms, to find out which storage conditions induce storage disease. Also, a new laser prototype constructed by project partner NKT (see below) will be tested in the experimental storage rooms at Esteburg. This laser will be able to detect the gases released by the fruits in much more detail, enabling a more accurate indication of the fruit quality in the storage rooms.

NKT Photonics delivers redesign of SuperK MIR laser to Radboud University

The prototype of the new SuperK MIR laser, used in the first designs of the QCAP gas detector, has been improved. During the Summer, NKT Photonics has supplied Radboud University with three units of the updated laser system.



This new version of the SuperK MIR features numerous improvements over the prototype unit that Radboud University was using since 2017. Due to improvements in the optical

architecture, the SuperK MIR creates five times more output power within the wavelength range of interest, promising an even better resolution for the QCAP gas detector. A redesign of the internal electronics has also increased the reliability of the laser.

NKT Photonics is currently undertaking further work to improve the stability of the output and reduce the build costs of each unit. Recent tests involving optimisation of fibre lengths have already yielded cost reductions for future SuperK MIR units.

Meet Sacco te Lintel Hekkert,

Director of Sensor Sense

What is your expertise?

Sensor Sense develops highly sensitive, laser-based trace gas detectors. Our main product is the ETD-300 ethylene detector, which is the fastest, most sensitive and selective ethylene detector available on the market. We also make peripherals, which make the measurements simpler and more reliable. The ETD-300 is used in research laboratories all over the world.

Why do you participate in the QCAP project?

Sensor Sense is always looking for new techniques and new markets. The QCAP detector will become one of the first laser-based trace gas detectors capable of measuring a wide range of gases. This also has potential in other sectors such as detection of explosives or medical applications.

What is your most important challenge in this project?

There are three major challenges: firstly, analysing the measured spectra, which will undoubtedly involve interference from other gases.

Sacco te Lintel Hekkert

Secondly, making the final set-up manageable, both in terms of format and user interface. Lastly, keeping the selling price low enough to ensure the proposition is attractive to the market.

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