

# graced

*« An innovative, holistic and portable solution for food quality monitoring »*



The **GRACED** project aims to systematise contaminants measurements on fruits and vegetables throughout the value chains thanks to **ultra-compact low-cost sensors**.



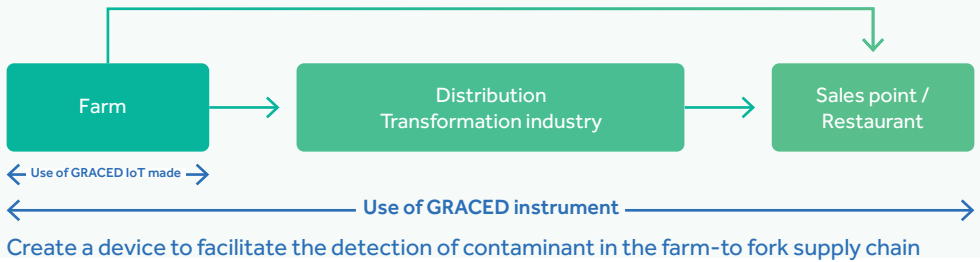
The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 101007448.

# THE GRACED APPROACH

In a context of **increasing demands for food security and traceability**, the GRACED project is developing a novel solution that will enable systematized quality measurements on fruits and vegetables from "farm to fork".

Throughout the **value chains**, the GRACED sensors will be able to measure microbiological and chemical contaminants at the ones offered by portable spectroscopy-based devices currently available.

This European collaborative project seeks to enhance quality standards in the food production, transformations and consumption.



# FIRST RESULTS OF THE PROJECT

The GRACED project during the year 2022 has been able to grow and improve by overcoming any difficulties that were encountered as it went along. In fact, the consortium has met several times to cope with different needs by finding alternative and original solutions. Therefore, the various modules of the project that were initially planned have gradually undergone numerous modifications and improvements.

The thermoelectric module has been carefully modified to allow proper connection with the new mechanical and fluidic module, in fact, these were repurposed to better suit the chip. (Figure 1)



Fig. 1 GRACED MEC, TCM, MFM

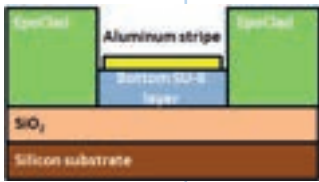


Fig. 2 GRACED chip

The first GRACED sensor generation has been developed (Figure 2) and achieved a bulk sensitivity around  $5 \mu\text{m}$  spectral shift per refractive index unit. This value is already competitive with the best literature reports using significantly more complex devices. Testing sensing with surface functionalization and a 2nd sensor generation are work in progress.

Regarding the OSS (optical subsystem) a more robust spatial filtering was implemented. With this new configuration, stray light has been substantially reduced but is still present. The plasmonic response was observed with the optical subsystem using the FAU (fiber array unit) output configuration which better filters the stray light. The microfluidics module (MFM) does not yet work with the 1st sensor generation, which we aim to fix with the 2nd generation.

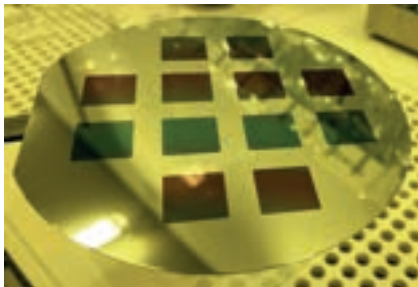


Fig. 3 GRACED wafer sensor

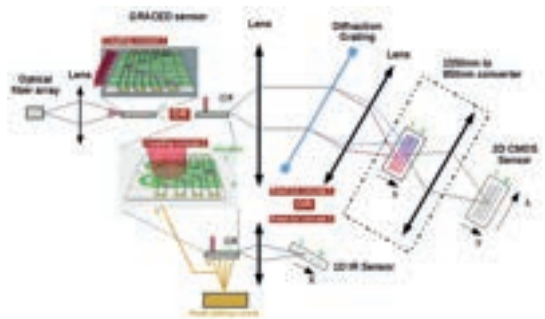


Fig. 4 prototype

Key figures of the GRACED project:

Duration: 42 months  
Funding: € 4,989,480.00  
14 partners in 8 european countries  
2 types of device prototypes  
7 contaminants detected simultaneously

A multi-actor consortium:

System integration & cloud platform experts



Academia and Research



Food industry representatives



Photonic biosensors SMEs



A project led by **CyRIC** ([info@cyric.eu](mailto:info@cyric.eu))

[www.graced.tech](http://www.graced.tech)