



Ministry of Science and Higher Education  
Republic of Poland

# Horizon4Photonics

Brokerage event

# Introduction

## Origin:

- Spin-off from the research group Applied Photonics Group (University of the Basque Country)

## Company mission:

- To apply photonic solutions to all kinds of industries.

## Own technology:

- Integration of spectroscopy-based sensors in food processes.
- Systems for real-time water analysis.
- Chemical baths monitoring system.

# Problem: Industry digitalisation

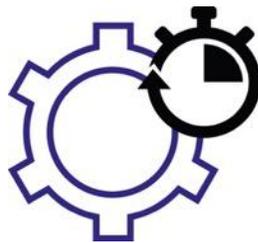
- ✓ Data through advanced instrumentation.
- ✓ Useful information.
- ✓ Real-time production adjustment and improved management.



## OBJECTIVES:

### ✓ Efficiency

Lower production costs, waste and reprocessing; resources optimisation.



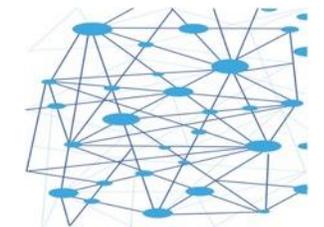
### ✓ Quality

Quality assurance, consistency, customer satisfaction and loyalty.



### ✓ Traceability

Origin and characteristics of the raw material assurance and detection of counterfeit products.  
Security.



# Solution: AONIR PLATFORM



- NIRS based sensors for in-line and real-time production characterisation.
- 1 Single device → 2 versions (Contact/Non-Contact).
- Sending final data to PLC / SCADA / IoT.
- Calibration development and maintenance service.



**Non-destructive** measurements and determination of multiple parameters **at the same time**.



Optimal results for **different kinds of products**: liquids, powder, grains, slurries, etc.



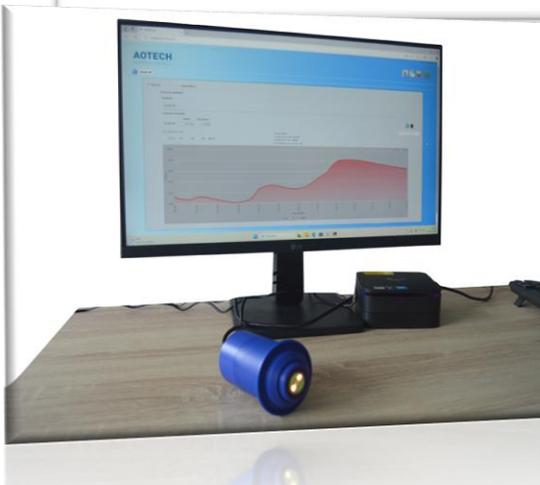
**Real-time data and in-line** installation.



Total quality management from raw materials to finished product → increase product **quality and consistency** with tighter control.



**Optimisation** of mixing times / **Monitoring** of fermentation and chemical processes / **Energy savings** in drying process → **Real-time** determination of moisture.



# FOOD INDUSTRY: Mayonnaise production

QUALITY CONTROL & TRACEABILITY: Spectroscopy+ IoT + Blockchain

## Quality control

Real-time monitoring of mayonnaise production.

- ✓ **Fat**
- ✓ **Protein**
- ✓ **Salt**
- ✓ **Sugar**
- ✓ **Moisture**
- ✓ **Ashes**



## Traceability

Blockchain-certified fat content reports.



The screenshot shows a digital report titled 'Prueba Blockchain' from AOTECH. It includes a QR code, a contract ID, and a certification statement: 'CODECONTRACT SL CERTIFICA que a 27/2/23 se ha registrado satisfactoriamente la prueba realizada por Eneko Perez (AOTECH). Dicha Prueba se desglosa a lo largo del presente certificado.' Below this is a table of metadata and a table of results.

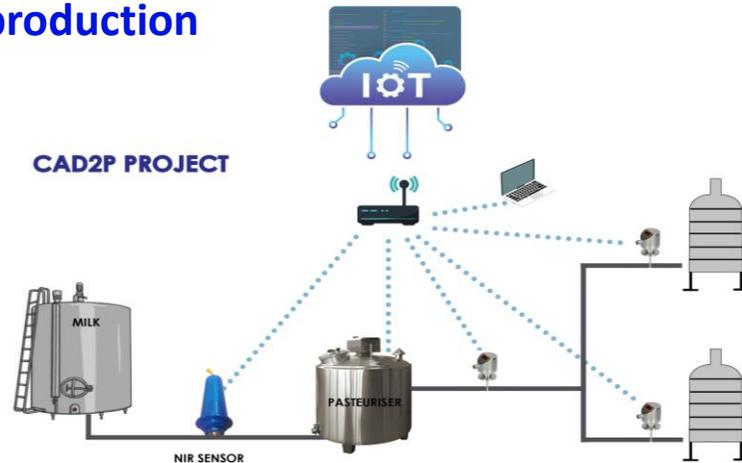
Información de la prueba	
Producto	Manzana
Huella digital de la prueba	da871c140e3fca6611a4ta05db56496d5b59ae13e0c56aed78ad27ef8ac
Código de verificación	14a448484deed13028e4a215d069e4598655d8a67a117bb6248a2b418b9c097
Fecha	2023-02-27 14:32:59 UTC

Clave	Valor
Producto	Manzana
Azúcar	14,7%
Acidez	0,25%

# FOOD INDUSTRY: Dairy sector

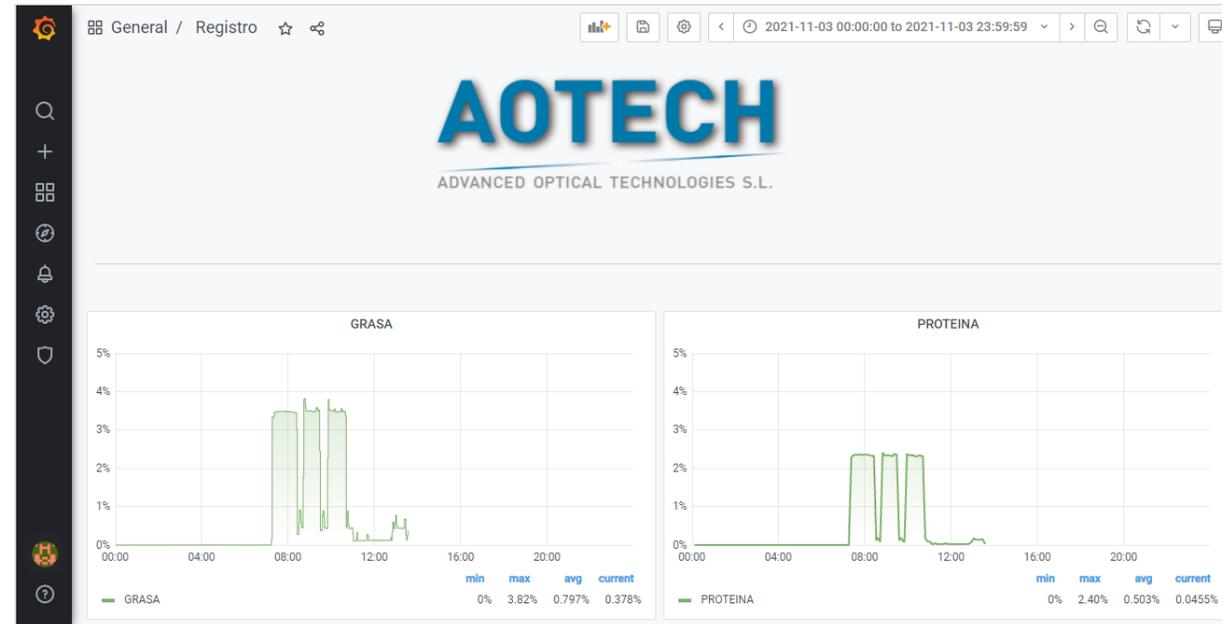
## Recipe adjustments for Greek Yoghurt production



**70% reduction in the variability of fat and protein content of the final product.**



## AONIR Platform



- ✓ DATA COLLECTION
- ✓ ALARM SETTINGS
- ✓ REPORTS
- ✓ BLOCKCHAIN CERTIFICATES

# FOOD INDUSTRY: Other sectors

## Olives:

- Pesticide
- Herbicide

## Bakery:

- Kneading
- Fermentation
- % Fat, Protein, Sugar, Salt

## Olive Oil:

- Cross-contamination with other vegetal oils

## Milk Powder:

- Fat
- % ○ Protein
- Moisture

## Feeds:

- Fat
- Protein
- % ○ Starch
- Fibre
- Ash
- Moisture

## Wine analysis:

- Actual alcoholic strength (%vol)
- Total Tartaric Acidity (g/L)
- pH
- Volatile Acetic Acidity (g/L)
- Reducing sugars (g/L)
- Glucose-Fructose (g/L)
- Malic Acid (g/L)
- Lactic Acid (g/L)
- Relative Density (20C)

# CHEMICAL INDUSTRY: Surface treatments

Chemical process monitoring. Real-time monitoring of analytes concentration (TRL6-7)

**OBJECTIVE:** “Adopting advanced technologies to become more efficient and sustainable.”

**Mirvat need:** Optimisation of the control of chemical baths used in surface treatments  
→ **reduction of waste and defects** in parts.

**AOTECH** Real-time monitoring of the state of the baths through spectroscopy → Service life extension → **Sustainability enhancement.**

NICKEL BATH	COPPER BATH
<ul style="list-style-type: none"> <li>✓ Ni</li> <li>✓ NiSO<sub>4</sub></li> <li>✓ NiCl<sub>2</sub></li> <li>✓ H<sub>3</sub>BO<sub>3</sub></li> <li>✓ Ph</li> <li>✓ DUCTILISIN G AGENT</li> </ul>	<ul style="list-style-type: none"> <li>✓ Cu</li> <li>✓ CuCN</li> <li>✓ KCN</li> </ul>
PICKLING BATH	CHROMIUM BATH
<ul style="list-style-type: none"> <li>✓ Fe</li> <li>✓ Hydrofluoric Acid</li> <li>✓ Nitric Acid</li> </ul>	<ul style="list-style-type: none"> <li>✓ Cr</li> <li>✓ Zn</li> <li>✓ Zr</li> <li>✓ Al</li> </ul>



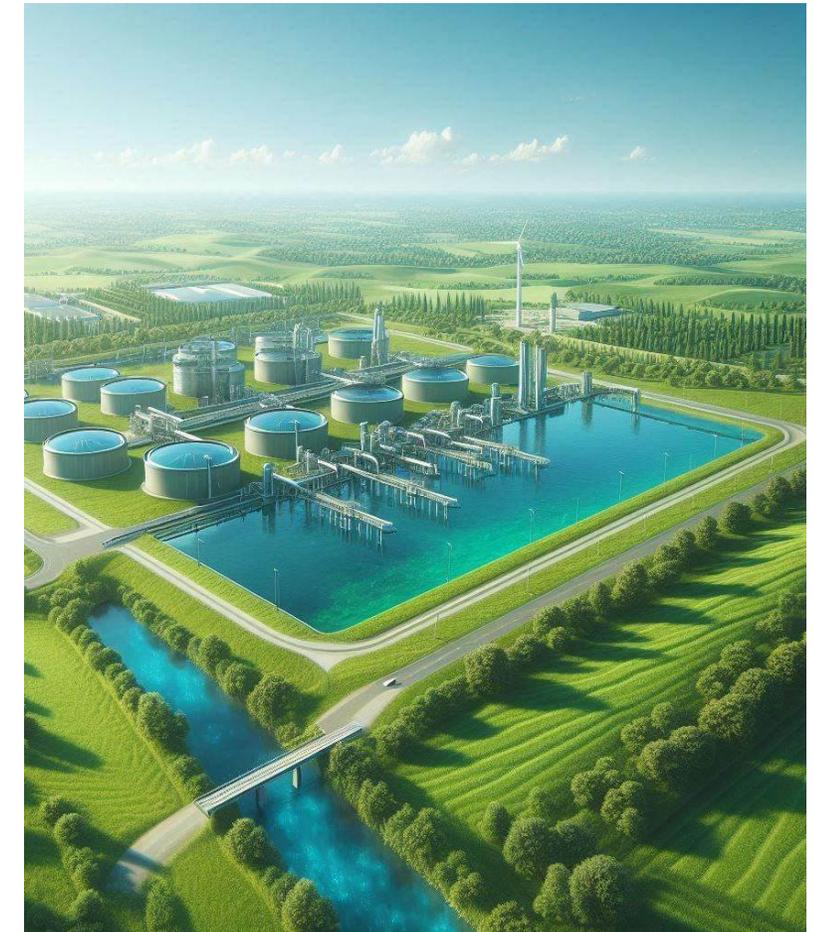
# WATER SECTOR

Real-Time Characterisation of Water Treatment Plants and Aquaculture (TRL4)



## Real-Time Monitoring of Various Parameters:

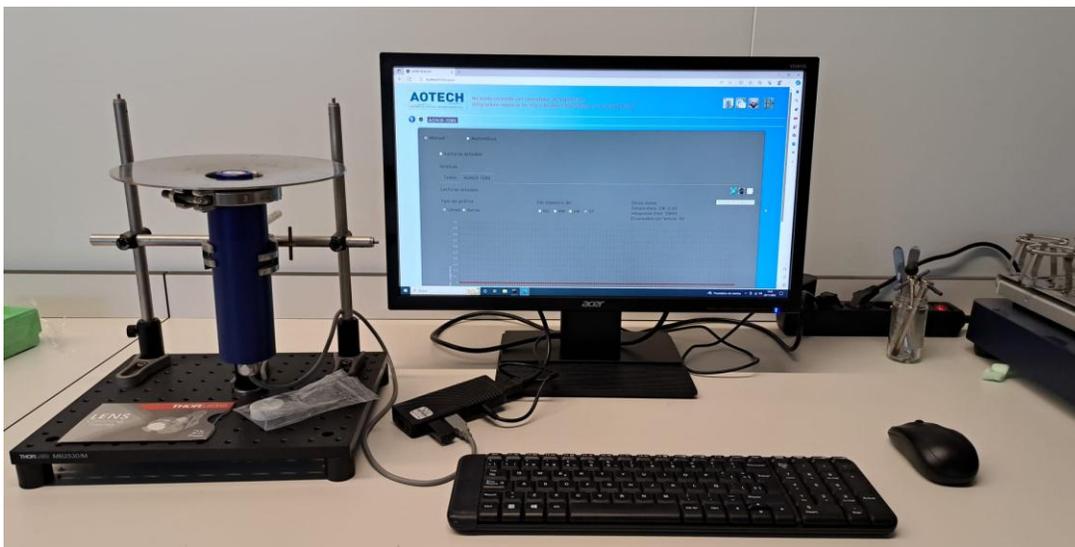
- COD (Chemical Oxygen Demand)
- Ammonium
- Nitrates
- Ammoniacal Nitrogen
- Nitrites
- Phosphorus



# FERMENTATION

## Alternative fungi-based protein (TRL 4)

Real-time monitoring of the fermentation process of food by-products (beer bagasse), using and taking dry weight loss as a reference parameter.



## WINE

- ❑ Real-time monitoring of malolactic, alcoholic and acetic fermentation.
- ❑ 5L Demo tank → 200L tank (autoclavable probe).
- ❑ Monitoring of bioreactor-based cultures.



# Looking for partners

We are looking for **pilot projects** to help us demonstrate the huge potential of our AONIR platform to achieve more efficient and sustainable production.

In addition, we are looking for partners to form **joint ventures** to collaborate in developing and commercialising specific solutions in different sectors.



# Thank you



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