

# NOVEL SENSING TOOLS FOR VISUAL DETECTION AND MONITORING OF AGRIFOOD ANALYTES AND PARAMETERS

Milzi Ludovica – ludovica.milzi@unina.it

Dept. of Agricultural Sciences, University of Naples Federico II, Via Università 100,  
80055 Portici (Naples), Italy

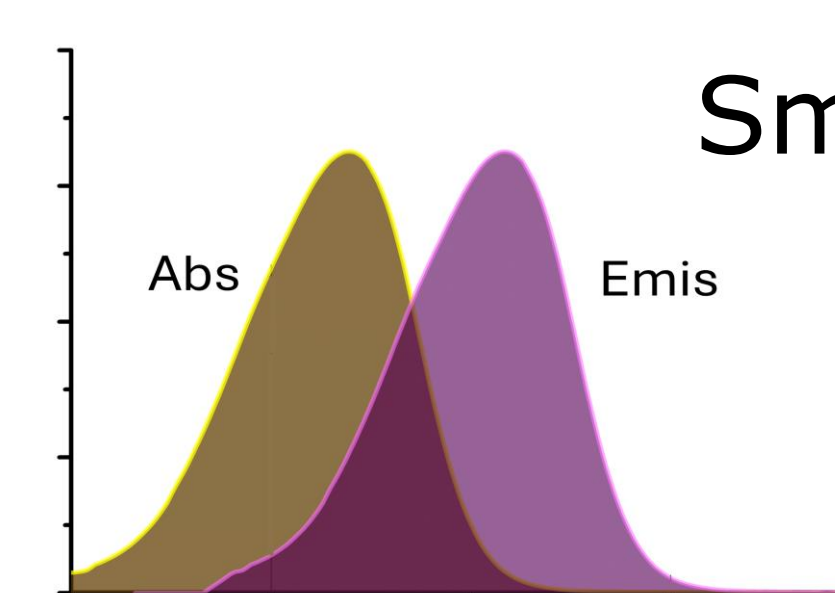
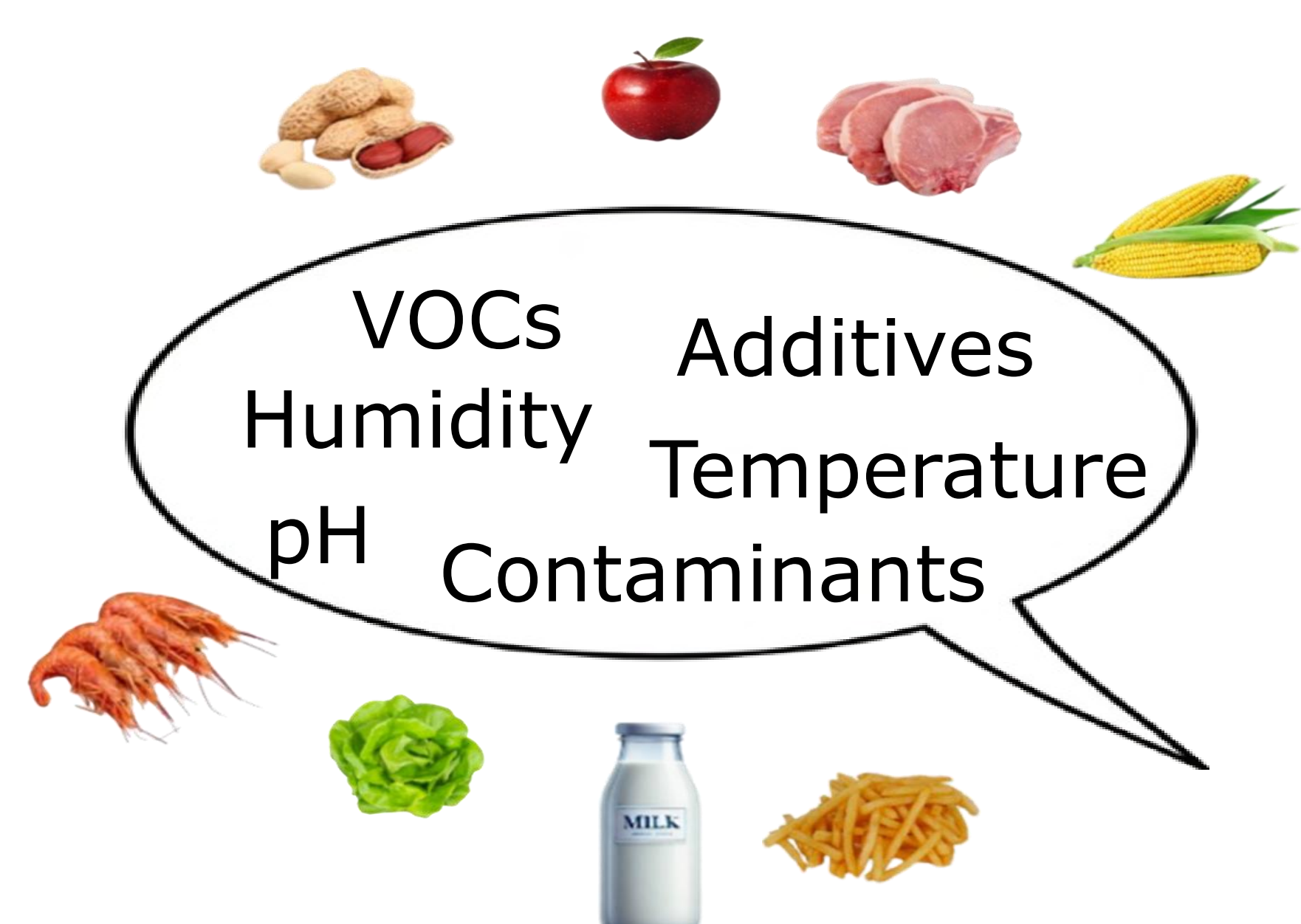
Tutor: Prof. Panunzi Barbara

## State of the art

Safety and quality monitoring in the agri-food sector relies on various techniques. Traditional spectroscopic and chromatographic methods suffer high costs and complex set up [1]. Today researchers look at cost-effective detection instruments, providing fast in-situ responses. Recent developments in visual sensors are based on novel tools, from low-molecular dyes to nanoparticles. They emerged to detect parameters (pH, temperature, humidity) and analytes (metals, additives, contaminants) relevant in food science [2-3].

## Objectives

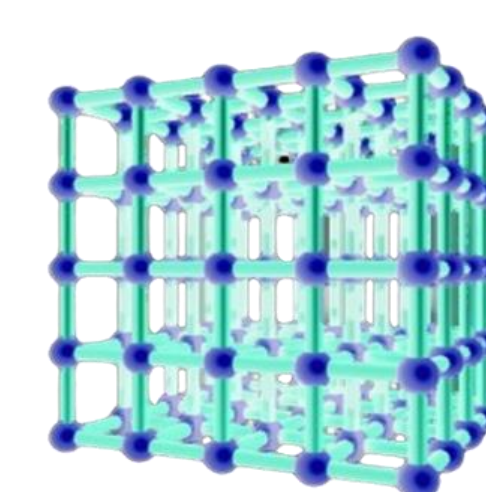
This PhD project focuses on developing optical sensing tools for detecting food parameters and analytes. The thinking pattern includes: literature research, synthesis of new responsive dyes in collaboration with the chemistry department, integration of the dyes into host matrices. In a first stage, pH and VOCs sensors will be obtained starting from natural or synthetic responsive dyes embedded in polymeric matrices (as agar or pectin) to track food freshness. In a second stage, more sophisticated sensors will be designed with the aim of detecting specific food analytes such as metals, additives and contaminants.



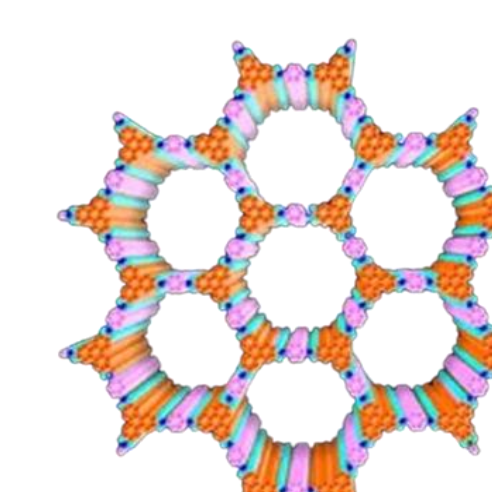
Smartphone devices

## TOOLS

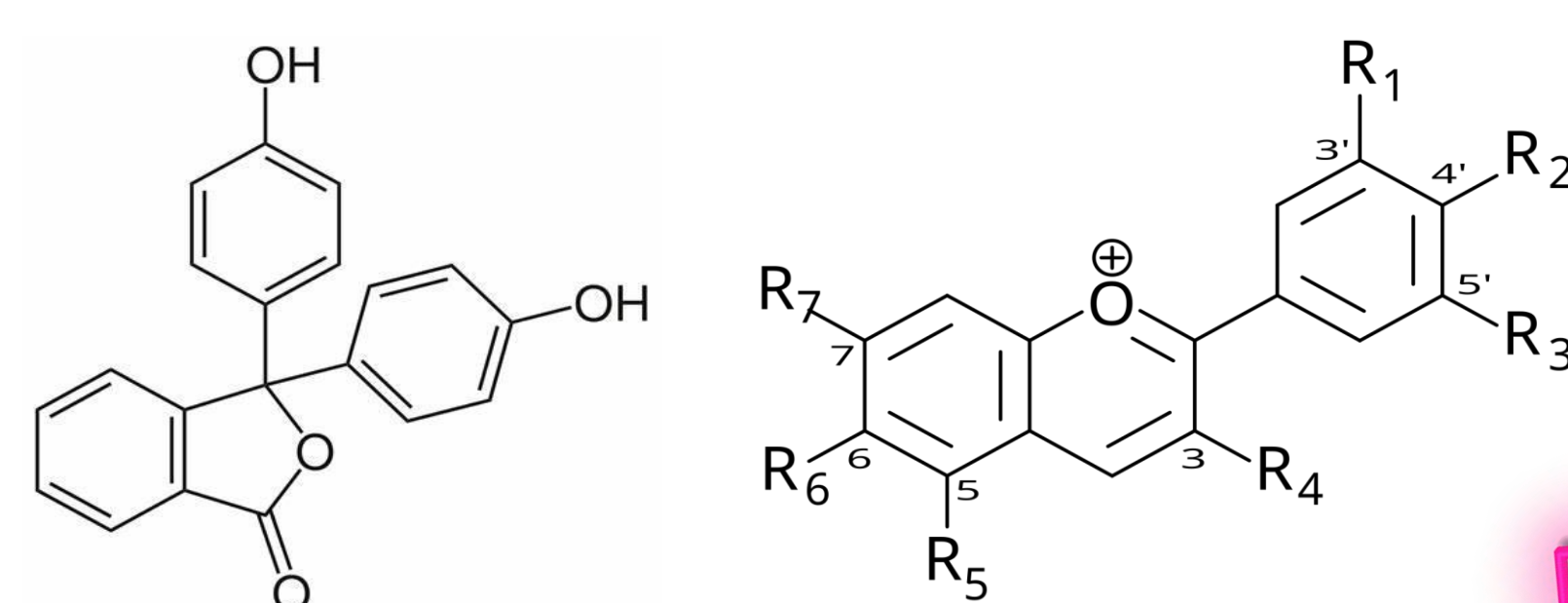
Embedded in host matrix



MOF



COF



## TIME FRAME

### MILESTONES

2023-2024

2024-2025

2025-2026

Q1

Q2

Q3

Q1

Q2

Q3

Q1

Q2

Q3

Research

Design of food-grade sensors

Design of new synthetic sensors

Design of more elaborated sensors

Thesis and Paper Preparation

[1] Wanniarachchi, P.C., Upul Kumarasinghe, K.G., Jayathilake, C., (2024). Recent advancements in chemosensors for the detection of food spoilage. Food Chem 436, 137733.  
[2] Janseerat, Kolekar, M., Reddy, C.S., Sharma, S., Roy, S., (2024). Anthocyanin-Based Natural Color Induced Intelligent Food Packaging Sensor: A Review. Curr Food Sci Tech Rep 2, 157-167.  
[3] Wu, W., Li, Y., Song, P., Xu, Q., Long, N., Li, P., Zhou, L., Fu, B., Wang, J., Kong, W., (2023). Metal-organic framework (MOF)-based sensors for exogenous contaminants in food: Mechanisms, advances, and prospects. Trends in Food Science & Technology 138, 238-271.