**PhD:** Food Science

**Title: Innovative biosensors for cheese quality**

**Proposing supervisor: dr. Antonio Varriale, ISA-CNR**

**Co-superovisors: Prof. Marco Salvatore; Prof. Prospero Di Pierro**

**Objectives of the research project and interdisciplinary collaborations**

The study we intend to address with this project is the use of proteins, such as proteins that bind odorant molecules, as probes for the determination of volatile organic compounds (VOCs) through the development of an optical biosensor.

In particular, this phD project involves the development of biosensor capable of determining the quality and state of conservation of cheeses.

The analysis by analytical techniques such as gas-chromatography and gas-chromatography associated with mass spectrometry for the characterization of the VOC profile of cheeses is widely reported in the literature. However, the use of these analytical approaches requires expensive instrumentation, the use of specialized personnel and often require the pre-treatment of the samples to analyze with the consequent increase in the time and costs of the analysis.

In this project it is proposed the development of an optical biosensor for the analysis of the VOC profile according to the type of cheese, the production technology used, the storage parameters (humidity, temperature, etc.) and the curing time.

For the development of the biosensor will be used as a molecular recognition element a protein that binds odorant molecules that will be identified, produced, characterized and immobilized on the surface of the sensor in order to couple it to an optical and / or impedance signal transduction system. Measurements of the profile of the VOCs of cheeses will be carried out at the different stages of production and maturing of the cheese. Finally, the biosensor will be equipped with an internet of think (IoT) system, which will allow data to be collected, analyzed and transferred.

**Interdisciplinary collaborations:**

Ing. Adolfo Cavallari, Megaris, Electronics and Electromechanical Systems, Caserta;

Prof. Antonio Sasso, Dipartimento di Fisica, Università di Napoli Federico II

**Innovation and originality of the project in relation to the state of the art**

The project involves the development of an experimental protocol for the realization of an optical biosensor based on the use of proteins belonging to the family of odorant-binding proteins to monitor the quality of cheeses in situ.

It will be the first portable device to be used directly in the industry to monitor the quality of cheeses.

**Grant availability** (funds to support the research activities):

The availability of funds for the purchase of all reagents necessary for the research activities envisaged by the project and for the participation of the PhD student in conferences on the themes of the project is ensured.

**Collaborations with foreign institutions:**

Prof. Zygmunt Gryczynski, Tucker Technology Center, TCU CSE, Texas, US

Prof. Piotr Bojarki, Uniwersytet Gdański , Poland