H.F.R.I.
Hellenic Foundation for Research & Innovation

Description of the funded research project

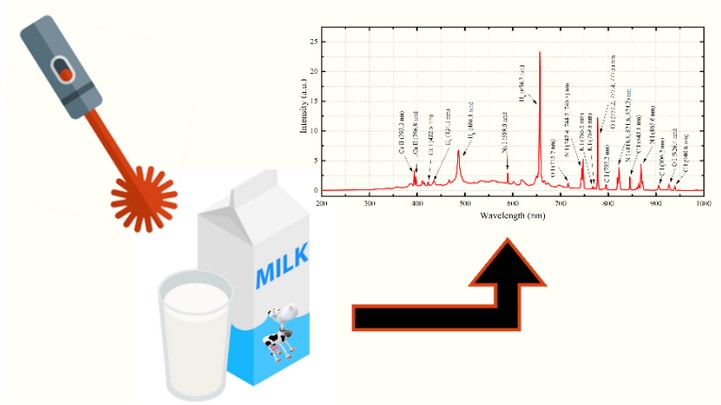
1st Call for H.F.R.I. Research Projects to Support Faculty Members & Researchers and Procure High-Value Research Equipment

Title of the research project: Laser Assisted Milk Analysis

Principal Investigator: Prof. S. Couris

Reader-friendly title: LAMA

Scientific Area: Optics, Quantum Optics, Laser Physics



Institution and Country: Department of Physics, University of Patras & Institute of Chemical Engineering Sciences (ICE-HT), Foundation for Research and Technology (FORTH), Greece

Host Institution: Institute of Chemical Engineering Sciences (ICE-HT), Foundation for Research and Technology (FORTH), Greece

Collaborating Institution(s): Agricultural University of Athens

Budget: 199.320 €

Duration: 36 MM

Project webpage (if applicable):

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Research Project Synopsis

Lasers and photonic technologies having, nowadays, reached a satisfying level of maturity provide reliable and competent solutions for several needs emerging in modern societies and they are increasingly employed in numerous applications ranging from scientific research to surgery and from metals cutting/welding to forensic sciences and security issues to mention few of them. Among the various applications of laser technologies, Laser Induced Breakdown Spectroscopy (LIBS) has been established as an efficient tool for the rapid, in-situ or remote qualitative and quantitative elemental analysis of solid, liquid and gaseous materials/samples without requiring any pre-treatment.

The major goal of the “Laser Assisted Milk Analysis (LAMA)” research project, is to demonstrate that LIBS, can operate efficiently, for the real-time analysis and identification/classification of the different types of milk (i.e., cow, goat and sheep milk) and the development of protocols to detect adulteration.

The main objective of the proposed research is the development of a reliable laser-based methodology, assisted by modern machine learning algorithms, for the discrimination and recognition of the different types of milks found in the Greek market.

Project originality

The proposed research project aims to combine a modern laser-based technique, LIBS, with advanced machine learning approaches in order to provide a reliable and efficient tool for the classification/identification of different types of milk and the detection of adulteration.

The proposed methodology can operate in-situ or remotely, without requiring any pre-treatment of the milk samples while it can provide the results in almost real time (i.e., in few milliseconds).

To the best of our knowledge, it is the first time that such a systematic approach is applied to a large data set of types of milk, including all types of milk that exist in the Greek market.

Expected results & Research Project Impact

The LAMA project involves interdisciplinary research coinvesting both in infrastructure and human potential for food quality control, aiming to automate classification/identification of different types of milk and develop new tools useful to food industry and agriculture. The outcome of the project can have multiple impacts with several societal and economic implications. So, both the public health and the dairy market can be benefited from a fast, cheap and reliable laser-based tool for the classification/identification and adulteration's detection of the different types of milk. The quality standards and safety of milk can be reinforced, reflected eventually on the market and the value of the dairy products. It is expected that through the dissemination of the project's results and the scientific and technological knowledge produced, the whole production chain from the farmer and the industrial dairy sector up to the consumer could be benefited.

Last, the rational and standardized exploitation of a valuable raw material (milk) with increasing market potential worldwide can act as growth tool for the SMEs of dairy sector. Products with high-added value, especially in regions, which face limitations regarding high-scale quantitative production, is generally considered as the major tool to increase competitiveness, at local, national and international level, and thus growth.

The importance of this funding

The H.F.R.I. funding has two major consequences:

i) the involvement of young researchers (i.e., highly motivated PhD candidates and Master students) who will be well trained in state-of-the-art laser/photonic technologies and will develop important skills and expertise in machine learning. For some of them, their hiring prevented the “brain drain”.

ii) the present funding allows us to develop, apply and assess a fast, cheap and reliable laser-based tool for the classification/identification and adulteration’s detection of the different types of milk which can be beneficial both for the public health and the dairy market.

Of high importance is the fact that the proposed research methodology can be further exploited for other types of food as well, providing them a *Quality Mark*, which can have important impact on the market value of these products.

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