

Development and characterization of biobased trays, flexible films, active coatings and antimicrobial packaging structures for mediterranean foods

PhD Title

Starting date : 15/09/2024

Contrat doctoral

UNIVERSITY OF BURGUNDY & IATA-CSIC VALENCIA

Place of work

Mainly in Dijon, University of Burgundy – France, and partly at IATA-CSIC in Valencia (co-tutelle PhD)

PhD title

Development and characterization of biobased trays, flexible films, active coatings and antimicrobial packaging structures

Scientific domains

- Food sciences
- Packaging - biomaterials
- Physical-chemistry

Key-words

Agro-food by-products, packaging, active coating,

Description of the PhD project

Context and objectives

The PhD project is part of the joint EU-PRIMA EVOLVEPACK project, involving partners from Mediterranean area (Croatia, France, Israel, Morocco, Portugal, Solvenia, Turkey) and Spain (project coordinator). The “EVOLVEPACK” is framed in the context of innovative sustainable strategies for reducing food waste in the Mediterranean area through the use of sustainable, environmental-friendly, cost-effective and antimicrobial packaging materials to control food hazards by inhibiting microbial growth. The overall objective is to design and produce innovative, costeffective, compostable and/or recyclable food packages based on active bioplastics and cellulosic materials. Trays, flexible films and absorbing pads will be developed considering a circular economy strategy. A thorough analysis of the antimicrobial packaging structures in terms of composition, antimicrobial characteristics, safety assessment and validation in food products will be carried out. These materials will be used to pack fruit/vegetables and fish, which are the basis in the Mediterranean diet, but are prone to rapid deterioration.

The PhD aims at characterization of bioactives and biopolymers (WP2 of project) for the development and characterization of biobased trays, flexible films, active coatings and antimicrobial packaging structures (WP3).

The project of the PhD student will be concern mainly by the tasks of WP3 of the project. The aim is to develop novel sustainable active packaging structures. To this end, cellulose and bioplastic-based trays will be developed using cellulose rich-fractions obtained from rice straw and, mushrooms and marine biomasses, respectively. Then, active coatings formulated with biopolymers and polyphenolic-rich extracts, with potential functional properties, will be applied on commercial films of polylactic acid (PLA) or cellophane, or films obtained from post-consumer PLA obtained from recycling sources and, on the developed trays. The trays will be sealed with suitable compostable films with active properties. Cellulose-based absorbing pads obtained from rice straw will be developed using different strategies (high-pressure homogenization, ionic liquids, supercritical CO₂) and then, functionalized with antimicrobial enzymes (eg. endolysins). Safety assessment and migration of contaminants and active will be carried out during the PhD.

Funding

3 year contract – net salary about minimum 1700€/month (minimum gross salary 2100 €/month according to French regulation for PHD).

Précisions sur le financement

PRIMA (EU Project)– ANR

Presentation of the institution and lab

JOINT UNIT UMR PAM – UNIVERSITY OF BURGUNDY (INSTITUT AGRO-DIJON - INRAE)

Presentation of the hosting research unit and working environment.

The thesis will be mainly hosted in the research unit PAM – Food Processing and Microbiology (UMR A02.102, Université de Bourgogne, Institut AgroDijon, INRAé, France), and partly in the IATA-CSIC lab (Valencia).

University of Burgundy (UB) is a multidisciplinary higher education institution for both education and research, and particularly well ranked for food sciences in the well-known ARWU or Leiden rankings. The Joint Unit “Food Processing and Microbiology” UMR PAM A02.102 (UB+ Institut Agro Dijon + INRAé) is a major player in scientific and technological progress in food and wine knowledge and technologies. The scientific approach shared by all members is to understand the physical, chemical and biological phenomena that determine the quality of food in order to develop new foods and new food processes. Physico-chemical group is highly involved in the development and characterization of biopackaging materials and their uses. UMR PAM will be involved and leading the work package (WP3) related to packaging and shelflife. The aims of the WP3 is to select, adapt, develop and test a variety of eco-friendly active bio-packaging products to extend the shelf-life of the MedMeals designed for delivery and “ready-to-eat/cook” markets while reducing agro-food waste.

IATA-CSIC - The Institute of Agrochemistry and Food Technology (IATA), created in 1966, is a center of the Spanish National Research Council (CSIC). Its scientific-technical objective is to carry out research of excellence on the production of sustainable and quality food, taking into account its safety, health impact and consumer acceptance.

IATA research can be grouped into the following lines of research : Food safety and preservation/innovation in food and processes/Diet, microbiota and health/Food biotechnology. The PhD will be involved in the Preservation and packaging technologies groups if IATA.

The project includes periods (co-tutelle) in the IATA-CSIC for some parts of the project.

Tight collaborations will be also involved with the university of Zagreb and other partners of project.

Website :

<https://www.u-bourgogne.fr/universite/organisation/laboratoires-et-entites-de-recherche>

<https://www.umar-pam.fr/fr/>

<https://www.iata.csic.es/en/research>

Expected profile

Skills and experience. Master or engineer degree in food chemistry and engineering and/or polymer/packaging sciences, mainly focused on physical chemistry. Knowledge of characterization techniques of biopolymer materials (structure, surface, optical, transport and mechanical properties) as well as biochemical knowledge on food will be appreciated. Experience in mass transport modelling is a plus. Good written and spoken language skills in English are required, French or Spanish would be appreciated.

Application dates and contacts

From now to 27th June 2024.

Interviews (online) week of 1st of July.

Send CV and motivation letter to :

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