



## **H2020 MSCA ITN FoodTraNet**

### **Call for ESR Applications**

**15 ESR positions are available for a new generation of scientists who will work on research topics of global importance**

The FoodTraNet network opens a call for applications within the framework of the FoodTraNet project (Advanced Research and **Training Network in Food Quality, Safety and Security**). These positions will be funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 956265.

The Marie Skłodowska-Curie Action “Advanced Research and **Training Network in Food Quality, Safety and Security**” – “FoodTraNet” is designed to provide high-level training of a new generation of high achieving Early Stage Researchers (ESRs) in a common platform of advanced mass spectrometric tools for food quality, safety and security. In the rapidly developing field of food science, researchers require a multidisciplinary, intersectoral grounding in these tools to extract all the potential from traditional and newly available methodologies and techniques. Although already available, a translational gap exists between research capability and industrial uptake that needs to be bridged to ensure efficient use. FoodTraNet is designed to bridge this gap by creating a multidisciplinary training and research network that will give ESRs the ability to transfer their knowledge from basic sciences to industrial applications.

FoodTraNet will cover techniques including stable isotopes, target, suspect, non-target screening and mass spectrometry imaging to meet the following objectives:

- 1) To identify biomarkers and bioactive compounds to assure food quality and traceability.
- 2) To characterise novel foods to support food safety and security.
- 3) Develop and characterise new products based on the latest advances in nanotechnology, including edible photonic barcodes, nano-sensors, multi-functional polymer nanostructured materials, and new, active and intelligent packaging.

These goals will be achieved through a combination of individual research, non-academic placements, workshops, and complementary transferrable skills training facilitated by the academic-non-academic composition of the consortium. Substantial industrial involvement in the project, with the full participation of Barilla, CONCAST and SMEs from different sectors, will provide ESRs with the skills necessary for thriving careers in a burgeoning field underpinning food research across a range of diverse disciplines.

Each ESR will be provided with an individualised structured and comprehensive research programme, learn theory and gain first-hand laboratory experience. In addition, to studying at his/her hosting institution, the ESR will spend time at a partner university/research centre/company. Being trained in a highly relevant research field will enhance researchers career prospective and employability.

**FoodTraNet aims to recruit 15 outstanding and highly motivated ESRs** (Table 1) to meet the ambitious goals of the project. Interested applicants can find detailed information on each position (ESR 1 to 15) below or on the FoodTraNew website [www.foodtranet.org](http://www.foodtranet.org).

**The application, in English, must be done using FoodTraNet application form. To access the application form click on this link: <https://www.foodtranet.org/apply.html>. The deadline for application is June 30, 2021 (23:00 CET).**



ESR no	ESR Project Title	Hosting Institution	PhD awarding body	Main Supervisor
1	Markers for pasta and rice organic authentication - WP1, WP2	Fondazione Edmund Mach (FEM), Centre for Research and Innovation, San Michele All'adige, Italy	University of Trento (UniTN), Trento, Italy	Dr. Federica Camin – Dr. Luana Bontempo
2	Authenticity of dairy products - WP2, WP1	Fondazione Edmund Mach (FEM), Centre for Research and Innovation, San Michele All'adige, Italy	University of Trento (UniTN), Trento, Italy	Dr. Elena Franciosi
3	Distinctive multimodal molecular organic and traditional wine characterisation - WP1	Universiteit Maastricht (UM-M4i), Imaging Mass Spectrometry, Maastricht, Netherlands	Universiteit Maastricht (UM-M4i), Maastricht, Netherlands	Prof. Ron Heeren
4	Development of novel edible photonic barcodes for food tagging and tracing - WP3, WP1	Jožef Stefan Institute, Department of Condensed Matter Physics, Ljubljana, Slovenia	Jožef Stefan International Postgraduate School (JSIPS), Ljubljana, Slovenia	Dr. Matjaž Humar
5	Characterisation of bioactive compounds in organic beekeeping - WP1	Consejo Superior de Investigaciones Científicas (CSIC-INIA), Department of Environment and Agronomy, Madrid, Spain	Universidad de Almería (UAL), Almería, Spain	Prof. María Dolores Hernando
6	Novel strategies for verifying food authenticity and build consumer trust – WP5	Jožef Stefan Institute, Department of Environmental Sciences, Ljubljana, Slovenia	Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia	Prof. Nives Ogrinc
7	Alternative waste exploitation: micro and nano-plastic in agricultural wastewater reuse - WP2	Consejo Superior de Investigaciones Científicas (CSIC-INIA), Department of Environment and Agronomy, Madrid, Spain	Jožef Stefan International Postgraduate School (JSIPS), Ecotechnologies, Ljubljana, Slovenia	Prof. María Dolores Hernando
8	Synthesis of “smart” polymer nanostructured materials for use in food research - WP3, WP2	Aristotle University of Thessaloniki (AUTH), Chem./ Environ. Pollution Control Laboratory, Thessaloniki, Greece	Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece	Prof. Dimitra Lambropoulou
9	Chemical food safety of novel foods of animal origin for human consumption - WP2	University of Antwerp (UA), Toxicological Centre, Antwerp, Belgium	University of Antwerp (UA), Antwerp, Belgium	Prof. Adrian Covaci
10	Alternative waste exploitation: contaminants of emerging concern in agricultural wastewater reuse - WP2	Jožef Stefan Institute, Department of Environmental Sciences, Ljubljana, Slovenia	Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia	Prof. Ester Heath
11	New chemical and bio-sensors for food quality and safety – WP3, WP1, W2	Institute for Environmental Protection and Sensors Ltd. (IOS), Maribor, Slovenia	University of Maribor (UM), Faculty of Mechanical Engineering, Maribor, Slovenia	Prof. Aleksandra Lobnik
12	The synthesis of smart biopolymer materials with nanostructured surfaces with antimicrobial, biocompatible, anti-adhesive properties - WP3	Aristotle University of Thessaloniki (AUTH), Chem./ Environ. Pollution Control Laboratory, Thessaloniki, Greece	Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece	Prof. Dimitrios Bikiaris
13	Functional coatings for active packaging development - WP3	University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia	University of Maribor (UM), Faculty of Mechanical Engineering, Maribor, Slovenia	Prof. Lidija Fras Zemljič
14	Plastics in Seafood - WP1, WP3	Universiteit Maastricht (UM-M4i), Imaging Mass Spectrometry, Maastricht, Netherlands	Universiteit Maastricht (UM-M4i), Maastricht, Netherland	Prof. Ron Heeren
15	Consumer awareness and perception – WP5, WP1, WP2, WP3	WRG Europe Ltd, Exeter, United Kingdom	Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia	Dr. Vicky Edkins

Table 1 FoodTraNet ESR positions



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 956265.



## ESR Hosts

7 academic and 2 industrial partners in 7 countries



## Participating & Supporting Organisations (ESRs secondments)

Stichting Effost	EFoST	Netherlands
Food Concept	FC	Poland
Barilla G. E R. Fratelli Spa	Barilla	Italy
Jožef Stefan International Postgraduate School	JSIPS	Slovenia
Target Analysis SA.	TA	Greece
Athanasios El. Hatzopoulos Viomichania Epexergasias Chartou Ae	AHat	Greece
Meveco Bv	LOV	Netherlands
Domein Aldenborgh	DAE	Netherlands
Food Forensics Ltd	FF	United Kingdom
Universidad de Almería	UAL	Spain
Uniwersytet Warmiński Mazurski w Olsztynie	UWM	Poland
Stowarzyszenie Szlak Oscypkowy	OCT	Poland
Zakład Miesny Konarczak Sp. J.	MPPK	Poland
National Institute for Public Health	NIJZ	Slovenia
Universitaet Fuer Bodenkultur Wien	BOKU	Austria
Organic Services GmbH	OrgSer	Germany
Agilent Technologies Spain S.L.	Agilent	Spain
Trentingrana - Consorzio Dei Caseifici Sociali Trentini Societa Cooperativa Agricola	CONCAST	Italy
Università degli studi di Trento	UniTN	Italy
International Union of Food Science and Technology	IUFoST	Canada

### COORDINATING ORGANISATION

Jožef Stefan Institute on behalf of the FoodTraNet consortium

### RESEARCH FIELDS

Food Security, Circular Economy, Nutrition and Health, Nanotechnology

### RESEARCH PROFILE

Early Stage Researcher (ESR)

### APPLICATION DEADLINE

30 June 2021 23:00 – CET  
(Europe/Brussels)

### SELECTION COMPLETED

by 31 July 2021

### ESR SELECTED AND RECRUITED

by the deadline 31 January 2022

### EU RESEARCH FRAMEWORK PROGRAMME

H2020 / Marie Skłodowska-Curie Actions

### MARIE CURIE GRANT AGREEMENT NUMBER

956265

### WORK LOCATION

Multiple locations  
(secondments to project partners)

### TYPE OF CONTRACT

Temporary

### JOB STATUS

Full-time, 36 Months

### INDICATIVE WORKING HOURS PER WEEK

40



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## Eligibility Criteria

FoodTraNet is looking for a broad international representation of Early Stage Researchers. The network acknowledges its responsibility for recruiting researchers and their working and living conditions, as stated in the document “The European Charter for Researchers - Code of Conduct for the Recruitment of Researchers”.

- **MOBILITY**

The positions are open to all nationalities. However, your application has to comply with the European Commission’s Mobility Rules, meaning that at the time of recruitment, you must not have resided or carried out your main activity (work, studies, etc.) in the country of the host organisation for more than 12 months in the three years immediately before the reference date (indicative start of the employment contract, Month Date 2020). Compulsory national service and short stays such as holidays are excluded (European Commission’s Guide for Applicants).

- **EARLY STAGE RESEARCHER (ESR)**

If you have already gained prior work experience in academia, you shall be in the first four years (full-time equivalent research experience) of your research career at the time of recruitment by the host organisation and have not been awarded a doctoral degree. Full-time equivalent research experience is measured from when you obtained the degree entitling you to embark on a doctorate, even if a doctorate was never started or envisaged. Part-time research experience will be counted *pro-rata* (European Commission’s Guide for Applicants).

- **EXCELLENT PROFICIENCY OF THE ENGLISH LANGUAGE**

Network fellows (ESRs) must demonstrate that their ability to understand and express themselves in both written and spoken English is sufficiently high for them to benefit from the network training.

- **RELEVANT UNIVERSITY DEGREE**

ESR applicants must hold a master’s degree (or equivalent) relevant to the project(s) for which they apply. For further information, please consult the detailed information for each position. Applicants should not have been awarded a PhD degree. Additional requirements can apply for specific positions.

If any of the prerequisites mentioned above are not satisfied, FoodTraNet reserves the right to exclude applicants from the selection process at any time, even after the selection procedure has taken place.

## Application process

**The application, in English, must be submitted electronically by email to the FoodTraNet email address [info.foodtranet@ijs.si](mailto:info.foodtranet@ijs.si) before the application deadline.**

**The application consists of downloading and completing the [Application Form](https://www.foodtranet.org/apply.html), available here: <https://www.foodtranet.org/apply.html>, the submission of a [Curriculum Vitae](#), a [Covering Letter](#), your [Academic Records and Reference letter\(s\)](#) (if you have them) in a single PDF file.**

**The deadline for application is Wednesday, June 30, 2021 (23:00 - CET).**

The application form requires basic contact information (name, surname, email) and ESR eligibility criteria (date of Master’s award, full-time postgraduate research experience in months, country of residence and duration of residence in that country). Applicants are invited to choose up to three PhD Positions in order of preference. Only the complete applications (completed application form, CV, Covering Letter and Academic Records) will be evaluated. FoodTraNet is committed to Open, transparent, Merit-based Recruitment procedures of Researchers (OTM-R). Please contact [info.foodtranet@ijs.si](mailto:info.foodtranet@ijs.si) if you have any problems submitting your application.





## Selection Process

An applicant can apply for a maximum of three specific ESR projects listed in order of preference.

The selection committee will check applications against the following criteria:

- Scientific background and potential of the candidate as indicated by his/her experience.
- Fit to a research project.
- Evidence of ability to undertake research.
- Evidence of working within groups or teams.
- Impact and benefit of the proposed training to the candidate's research career.

Up to five candidates will be short-listed for each position and invited to an interview (interviews by video link will be held if candidates cannot travel).

Successful applicants are admitted to their selected ESR position and PhD programme following the order of the ranking list. The selected applicants must confirm by email their participation in the FoodTraNet ESR position to the project coordinator within 15 days. Applicants who fail to meet this deadline will be replaced by the next ranked applicant.

If there is no suitable applicant, the FoodTraNet network may recruit a qualified applicant for a different PhD position or launch a new call. The selected ESR will be expected to start their research as soon as feasibly possible (deadline 31.1.2022).

## Employment Conditions & ESR Benefits

The selected candidates are employed with a full-time contract. The salary follows the Marie Curie-Sklodowska ITN funding Scheme. All eligible researchers recruited within the ITN are entitled to receive the following salaries (gross amounts):

- Living allowance: 3,270 €/month gross amount corrected by a country-specific coefficient established by the European Commission<sup>1</sup>
- Mobility allowance: 600 €/month
- Family allowance: 500 €/month<sup>2</sup>

The amounts are total gross remuneration, including all social security contributions charged to the recruiting organisation and the PhD candidate. The amount depends on the country of the recruiting organisation and the applied laws and regulations. Tax regulations in the host countries apply. The family allowance is reserved for PhD candidates who have a spouse<sup>2</sup> or are maintaining a child at the recruitment date. Any change in family obligations after this date will not be considered.

An individualised career development plan will be prepared for each fellow together with his/her supervisor and will include training, planned secondments and outreach activities in partner laboratories of the network. The ESR fellows are expected to complete their PhD thesis by the end of the 3rd year of employment. The guaranteed PhD funding is for 36 months (i.e. EC funding). Any additional funding after this period will be dependent on the host institution in accordance with the expected time of completing a PhD.

FoodTraNet offers a dynamic and challenging position in an internationally-oriented organisation where each ESR will receive advanced education and conduct exciting research. In addition to their research, all ESRs will benefit from internships, secondments, and training modules.

<sup>1</sup> See the Marie Skłodowska-Curie Actions Work Programme 2018-20, pp. 94-95.

[https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-msca\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-msca_en.pdf)

<sup>2</sup> Namely, the PhD candidate must be linked to another person by a marriage, or a relationship with equivalent status to a marriage recognised by the legislation of the country where this relationship was formalised.





## ESR: Key Responsibilities

- To manage and carry out a research project within the duration of the FoodTraNet project.
- To write a PhD dissertation.
- To participate in research and training activities within FoodTraNet.
- To publish peer-reviewed scientific articles.
- To participate in meetings of different FoodTraNet consortium bodies.
- To disseminate project results to the scientific community (international conferences) and non-scientific community through outreach and public engagement.
- To liaise with research staff and students working in broad areas of relevance to the research project and partner institutions.
- To write progress reports and prepare results for publication and dissemination via journals, presentations and the web.
- To attend progress and management meetings as required and network with the other research groups.

## Confidentiality

Personal data will be collected, used, and processed according to the General Data Protection Regulation 2016/679 (GDPR). FoodTraNet commits to using applicants' personal information to implement the selection process and institutional purposes only. Participation in the selection process implies the applicant's consent to collecting, using, and processing their data by the FoodTraNet. All applicants will be informed of the outcome of the selection process.





# FoodTraNet ESR Projects

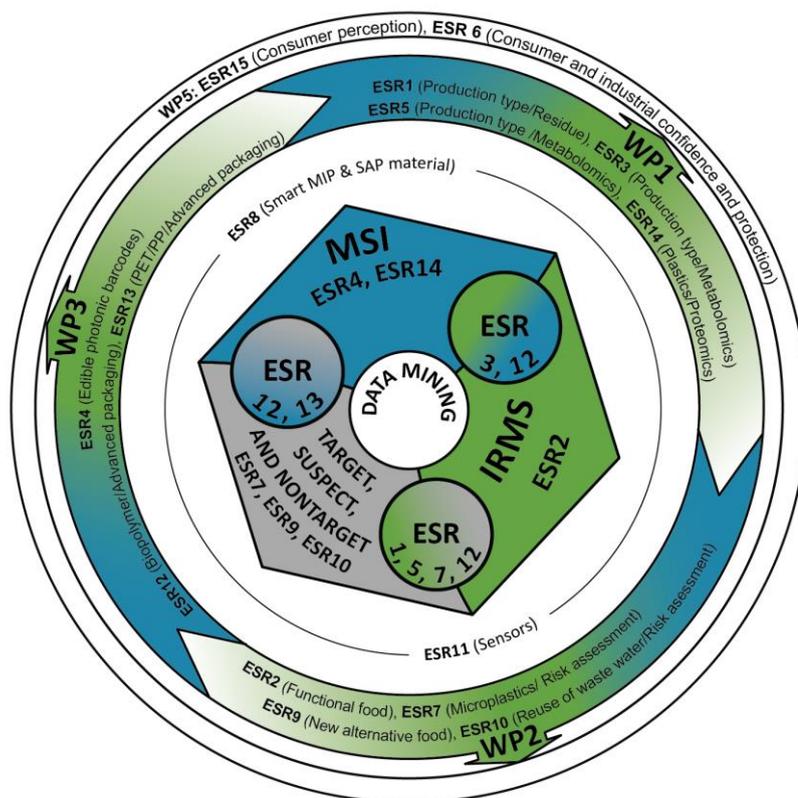


Figure 1 Interlinkage between 15 FoodTraNet ESRs and WPs

## ESR 1

**Project Title:** Markers for pasta and organic rice authentication - WP1, WP2

**Host:** Fondazione Edmund Mach (FEM), Centre for Research and Innovation, San Michele all'Adige, Italy

**Supervisors:** Dr. Federica Camin – Dr. Luana Bontempo

**Co-supervisor:** Prof. Nives Ogrinc (JSI)

**Enrolment in Doctoral Degree:** University of Trento (UniTN), Trento, Italy

### Context:

Globally, cereals are the most organically grown crop. In general, to be recognised as organic, a product must be produced respecting precise rules established in EC Regulation No 834/2007 that describes the farming practices allowed in organic production and the control systems to be carried out to guarantee their compliance. Despite this, and given that a certification centre evaluates the complete traceability of organic products, many frauds are still reported worldwide in the organic foods sector. Therefore, a need arises for analytical methods that can objectively guarantee the authenticity of these products. The potential to determine the geographical origin and the authenticity of plant-derived material using stable isotope ratios are well established in food authentication studies. In the last years, the stable isotope ratios determined in bulk products or specific compounds, particularly the nitrogen isotope ratio, have mainly been investigated as a promising marker of organic – conventional production systems. As a first approximation, natural abundance measurements by Isotope Ratio Mass Spectrometry (IRMS) provide information on plant species, geographical origin as well as on the agricultural treatments the plant underwent. This study aims to develop methods for bulk and compound specific analysis of stable isotope ratios for the characterisation of organic and conventional pasta and rice as



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well as for their geographical traceability.

#### **Objectives:**

To identify biomarkers for discriminating organic vs conventional pasta and rice using IRMS. Specific objectives include:

- Identification of markers for characterising organic and conventional productions using stable isotope ratios of bioelements in specific compounds by GC-IRMS or LC-IRMS, mycotoxin analysis, residual analysis (LC/GC-MS).
- Evaluation of the data through multivariate statistical analysis.
- Identification of markers for tracing the geographical origin of pasta and rice using stable isotope ratios of bioelements and the elemental composition by IRMS and ICP-MS.
- Creation of traceability models through multivariate statistical analysis.

#### **Methodology & Expected Results:**

Identified biomarkers capable of discriminating organic vs conventional pasta and rice (D1.1); A model for tracing the geographical origin of pasta and rice (D1.2.); Creation of the first database of authentic samples of pasta and rice (M1); Developed MS methods for determining bioactive compounds in pasta residue (M3).

#### **Planned secondments:**

S1: Barilla (M. Suman), 3 months, M7-9, technological preparation of pasta and mycotoxin analysis; S2: CSIC (R.A. Pérez/J.L Tadeo) 1 month, M17, residual analysis; S2S3: JSI (N. Ogrinc) 5 months, M25-29, ICP-MS and MC-ICP-MS analysis; S3S4: OrgSer (B. Hermann), 1 month, M32, Database management.

#### **ESR Profile and requirements:**

- A Master's degree recognised by the EU in one of the following disciplines: analytical chemistry, food chemistry, food science, biotechnology, pharmacy or related discipline.
- Not have resided or carried out his/her main activity (work, studies, etc.) in Italy for more than 12 months in the 3 years immediately prior to his/her recruitment.
- Preference will be given to candidates with the best academic study performances according to the ECST grading scale and recognised by the EU.
- Preference will be given to candidates with experience or competencies in analytical chemistry methods, particularly in IRMS, MS, GC and LC techniques.
- Preference will be given to candidates with experience or competencies in data treatment, data analysis and interpretation.
- The successful candidate will be highly motivated, organised, creative, and enjoys working independently and as part of a research team.

## **ESR 2**

**Project Title:** Authenticity of dairy products - WP2, WP1

**Host:** Fondazione Edmund Mach (FEM), Centre for Research and Innovation, San Michele all'Adige, Italy

**Supervisor:** Dr. Elena Franciosi

**Co-supervisors:** Dr. Federica Camin (UniTN)

**Enrolment in Doctoral Degree:** University of Trento (UniTN), Trento, Italy

#### **Context:**

Cheese is one of those food products with potential as a functional food because of its ability to convey bioactive compounds deriving from milk and beneficial health-related bacteria, but it is not yet fully evaluated. This means that the consumer is unaware of the possible nutritional value of functional fermented cheese and lacks knowledge of the authentic characteristics and properties of dairy-based functional foods.

#### **Objectives:**

Identify bioactive compounds related to animal feeding/farming and produce novel functional cheeses by adding bacteria already tested for healthy compound production. Specific objectives include:

- Characterisation of bacteria for their ability in producing bioactive compounds (B-vitamins, gamma-aminobutyric acid) and for their ability to restore the balance of the gut microbiota (bifidobacteria,



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propionibacteria) and whole-genome analysis for considering the possibility of their use in functional cheese.

- Identify differences in elemental and isotopic parameters between milk to cheese.
- Determine authenticity based on a prediction map (isoscape).
- Isotopically characterise the main bioactive compounds between milk to cheese using GC-C-IRMS.

#### **Expected Results:**

Validated methods and completed isoscapes for verifying the authenticity of traditional raw milk cheeses (D2.1); Identified bioactive compounds and putative probiotic bacteria in traditional raw milk cheeses and novel dairy products added with healthy and functional bacteria (D2.2); Database of authentic samples of raw milk cheeses (M1).

#### **Planned secondments:**

S5: CSIC (D. Hernando), 3 months, M9-11, analysis of bioactive compounds; S6: CONCAST (N. Cologna), 3 months, M15-17, production of experimental functional cheeses; S7: JSI (N. Ogrinc), 3 months, M20-22, elemental composition analysis; S8: FF (A. Johnson), 3 months, M27-29, statistical evaluation of the data with different methods, formation of isoscapes, knowledge exchange.

#### **ESR Profile and requirements:**

- Academic Master recognised by the EU in one of the following disciplines: microbiology, food chemistry, food science, biotechnology or related disciplines.
- Not have resided or carried out his/her main activity (work, studies, etc.) in Italy for more than 12 months in the 3 years immediately prior to his/her recruitment.
- Preference will be given to candidates with the best academic study performances according to the ECST grading scale and recognised by the EU.
- Preference will be given to candidates with experience or competencies in microbiological methods used to culture milk and cheese and molecular techniques such as DNA/RNA/protein extraction, qPCR, gel electrophoresis, cryopreservation, and other methods.
- Preference will be given to candidates with experience or competencies in data treatment, data analysis and interpretation, including statistical analysis.
- The successful candidate will be highly motivated, organised, creative, and enjoys working independently and as part of a research team.
- The researcher will play an active part in the scientific life of the international research environment of the FoodTraNet network.

## **ESR 3**

**Project Title:** Distinctive multimodal molecular organic and traditional wine characterisation - WP1

**Host:** Universiteit Maastricht (UM-M4I), Imaging Mass Spectrometry, Maastricht, Netherlands

**Supervisor:** Prof. Ron Heeren

**Co-supervisors:** Dr. Berta Cillero-Pastor (UM-M4I)

**Enrolment in Doctoral degree:** Universiteit Maastricht (UM-M4I), Maastricht, Netherlands

#### **Context:**

The Division of Imaging Mass Spectrometry at M4I is a world-leading institute in high-resolution molecular imaging of biological and material surfaces. The division targets the development and application of state-of-the-art mass spectrometry-based molecular imaging for biomedical research and food sciences.

#### **Objectives:**

To assess the differences between traditional and organic wine-making by combining stable isotope analysis with mass spectrometry imaging. Specific objectives include:

- Determine the molecular composition of commercial fertilisers and biodynamic preparations used in wine production, including identifying different strains of bacteria on the leaves.
- Determine the metabolic composition of organic and industrial wines.
- Understand the effect that biodynamic preparations have on the metabolic composition of vine leaves at high spatial resolution using DESI-IMS, MALDI-IMS and SIMS combined in a multimodal approach;



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- Determine specific isotopic ratios (C, N, H, O, Sr and Pb) in wine, leaves and soil to discriminate regional origin using IRMS, MC-ICP-MS and SNIF-NMR.
- Characterise the molecular profile of vine leaves using rapid evaporative ionisation mass spectrometry.

#### **Methodology and Expected Results:**

Multimodal analysis and data integration for improved wine classification/origin (D1.3); Implementation of fast screening methods for wine traceability (M2); Development of MS methods for determining bioactive compounds in wine (M3).

#### **Planned secondments:**

S9: JSI (N. Ogrinc), 3 months, M14-16, specific isotopic ratios of light elements in wine, leaves and soil and Sr and Pb isotope analysis; S10: FEM (L. Bontempo), 2 months M19-20 SNIF-NMR analysis and MS database formation; S11: Agilent (J. Escribano), 3 months, M27-29, Target analysis of bioactive compounds by LC-MS.

#### **ESR Profile and requirements:**

- Background in Analytical Chemistry, Biochemistry, Food Sciences, Microbiology, Pharmacy or similar.
- Preferably with experience in mass spectrometry, mass spectrometry imaging, separation sciences and bioinformatics.
- Experience with bacterial culture, protein isolation and bacterial identification.
- Outstanding academic study performance.
- You act with attention to quality, integrity, creativity, and cooperation in an international environment.
- Critical thinking, flexible, highly motivated and independent.

## **ESR 4**

**Project Title:** Development of novel edible photonic barcodes for food tagging and tracing - WP3, WP1

**Host:** Jožef Stefan Institute, Department of Condensed Matter Physics, Ljubljana, Slovenia

**Supervisor:** Dr. Matjaž Humar

**Co-supervisors:**

**Enrolment in Doctoral degree:** Jožef Stefan International Postgraduate School (JSIPS), Ljubljana, Slovenia

#### **Context:**

Traditionally barcodes are placed on the food packaging. However, to tag unpackaged bulk food and other products for food traceability and prevent counterfeiting, microscopic optically readable barcodes made out of edible materials and placed within the food would be desirable. The candidate will be developing and testing such barcodes.

#### **Objectives:**

To develop an edible photonic barcodes system for food traceability. Specific objectives include:

- To develop photonic barcodes made entirely of edible materials.
- To develop a handheld optical barcode reader for non-contact applications, e.g. through transparent packaging.
- Test the reliability, longevity and readout procedure of barcodes embedded in different foods (wine, olive oil and rice).
- Study the stability, migration and effects of the photonic barcodes in the food by mass spectrometry.
- Study consumer and industry acceptance of photonic barcodes.

#### **Expected Results:**

The project will deliver a demonstrable edible photonic barcoding system for food traceability (D3.1) and its characterisation using MSI (M9).

#### **Planned secondments:**

S12: WRG (V. EdkinsM. Pickard) 1 month, M10, learning traditional methods for food traceability; S13: FC (A. Fetlinski), 2 months, M18-19, studying consumer opinion about embedding barcodes; S14: M4I (B. Cillero Pastor), 2 months, M27-28, characterisation of photonic barcodes by MSI.



**ESR Profile and requirements:**

Candidates with physics or engineering background with experience in photonics are preferred. Experience in material science or chemistry is desirable but not required.

## ESR 5

**Project Title:** Characterisation of bioactive compounds in organic beekeeping - WP1

**Host:** Consejo Superior de Investigaciones Científicas CSIC-INIA, Department of Environment and Agronomy, Madrid, Spain

**Supervisor:** Prof. María Dolores Hernando

**Co-supervisors:** Prof. Amadeo Rodríguez Fernández-Alba (UAL)

**Enrolment in Doctoral degree:** Universidad de Almería (UAL), Almería, Spain

**Context:** Beekeeping is an ancient tradition in Europe, important for the environment, sustaining biodiversity by providing essential pollination for a wide range of crops and wild plants. Alongside honey, which is undoubtedly the most widespread bee product, bees also provide us with pollen, propolis and royal jelly from which people can benefit. However, there is limited evidence to support the approval of the health claims related to beekeeping products. The PhD student is expected to identify natural compounds and residues in beekeeping products from both conventional and organic production using targeted and screening methods based on mass spectrometry.

**Objectives:**

Characterise bioactive compounds as markers of organic beekeeping. Specific objectives include:

- Development of extraction methods for the analysis of bioactive compounds.
- Elucidation of chemical structures of bioactive compounds using mass spectrometry based techniques.
- Characterisation of honeybee products from different geographic areas (Spain, Italy and Slovenia) using IRMS.

**Expected Results:**

The candidate will identify specific markers capable of differentiating organic vs conventional beekeeping (D1.4); MS methods for determining bioactive compounds (M3); A database of bioactive compounds in organic and conventional food products (M4).

**Planned secondments:**

S15: AUTH (D. Lambropoulou), 3 months M7-10, develop knowledge and skills for the isolation and extraction of bioactive compounds; S16: JSI (N. Ogrinc/E. Heath) 3 months, M13-15, analysis of bioactive compounds and stable isotope analysis; S17: UAL-EURL (A.F. Alba) 3 months, M19-20-22; analysis of bioactive compounds by high resolution-MS (Orbitrap and QTOF); S18: Agilent (J. Escribano), 1 month, M17, training in advanced MS techniques.

**ESR Profile and requirements:**

- Academic Master recognised by the EU in one of the following disciplines: Analytical Chemistry, Chemistry, Food Sciences, or Pharmacy.
- Outstanding academic study performance.
- Expertise or knowledge of analytical chemistry, particularly in separation sciences and mass spectrometry, statistics and data management.
- Strong interest in basic and applied research.
- You act with attention to quality and creativity.
- Critical thinking, highly motivated and independent.
- Flexible and able to work in a team in an international research environment.





## ESR 6

**Project Title:** Novel strategies for verifying food authenticity and build consumer trust – WP5

**Host:** Jožef Stefan Institute, Department of Environmental Sciences, Ljubljana, Slovenia

**Supervisor:** Prof. Nives Ogrinc

**Co-supervisors:** Prof. Barbara Koroušič-Seljak (JSI)

**Enrolment in Doctoral degree:** Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia

### Context:

One of the main obstacles for commercial application of authenticity tests such as Stable Isotope Ratio Analysis (SIRA) is the availability of suitable reference sample databases and the cost and time required to develop databases for new products of interest. The proposed PhD will address this obstacle by investigating the question “how to build an appropriate database”, focusing on the following key points: a) What is the current state of the art for authenticity testing? What are tests currently available and widely used? b) What databases are available, how have they been collated, and where are they held? c) Sampling theory – what sampling strategies have been applied in previous studies? Which theories from other disciplines could be helpful for application in this study? E.g. Non-probability sampling (i.e. haphazard/convenience sampling) or probability sampling (i.e. simple random). d) Commercial considerations – what variables of commercial production need to be considered to develop a suitable database, and e) Identify target tests and products for validation studies (likely rice, oil, wine, meat, fresh produce). Further s/he will develop new sampling strategies based on theoretical and commercial considerations and validate the sampling strategy for target products and methods.

### Objectives and Methodologies:

To develop novel strategies to ensure commercial food authenticity. Specific objectives include:

- Determination of the optimum number and sampling frequency and analysis in food authenticity.
- Commercial considerations, i.e., what variables of commercial production need to be considered to develop a suitable database.
- Identification of target tests and products for validation studies (likely rice, oil, wine, meat, fresh produce).
- To assess regulatory barriers and drivers to sustainability.

### Expected Results:

The ESR will deliver an integrated consumer assurance protocol framework and toolkit for creating trust and ensuring food quality and traceability throughout the supply chain (D5.2).

### Planned secondments:

S19: FEM (L. Bontempo), 2 months, M10-M12, development and utilisation of novel sampling strategy for collection/collation of rice samples; S20: CONCAST (N. Cologne), 1 month, M13, knowledge exchange, training in commercial food production; S21: WRG (V. Edkins), 5 weeks, M22-23, knowledge exchange concerning the consumer interest, behaviour and trust.

### ESR Profile and requirements:

Food science, Chemistry with possible additional knowledge in data management: R programming, Python coding, SQL database/coding, and clustering and classification machine learning methods.

## ESR 7

**Project Title:** Alternative waste exploitation: micro and nano-plastic in agricultural wastewater reuse - WP2

**Host:** Consejo Superior de Investigaciones Científicas CSIC-INIA, Department of Environment and Agronomy, Madrid, Spain

**Supervisor:** Prof. María Dolores Hernando

**Co-supervisors:** Prof. Ester Heath (JSI)

**Enrolment in Doctoral degree:** Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 956265.



**Context:** While the impacts of microplastics (MPs) in the environment have been the subject of significant media and scientific attention, the research on the uptake and accumulation of MPs by plants is still very scarce. MPs may enter agricultural systems through a variety of means, such as through organic fertilization, plastic mulching, waste water irrigation, plastic littering, surface runoff or from atmospheric deposition of airborne MPs. The PhD student is expected to study whether MPs pass through the physical barriers of tissues of plants growing from treated wastewater and whether MPs translocate from roots to aerial parts, in a laboratory setting.

**Objectives:**

To assess uptake of MPs in crops grown on hydroponic conditions. Specific objectives include:

- Development of extraction techniques for mpsin root, stems and leaves.
- Optimisation of methodologies for the detection of MPs.
- Determination if the presence of MPs in irrigation water can reach edible parts of vegetables.
- Evaluation the role of MPs as scavengers of contaminants such as pesticides, bisphenols, pharmaceuticals, or PAHs.

**Expected Results:**

Assessment of agricultural irrigation with waters contaminated with MPs in relation to food quality and safety (D2.2); Development of methods for determining MPs (M3); Determination of water-to-plant transfer factor (TF) value (M7).

**Planned secondments:**

S22: AUTH (D. Lambropoulou), 1 month, M9, exchange of knowledge and skills for the extraction of contaminants; S23: JSI (E. Heath) 3 months, M16-18 determination of pharmaceutical and bisphenols using LC/MS; S24; Agilent (J. Escudero), 1 month, M21 knowledge exchange on the new state-of-the-art techniques in MS analysis; S25: UAL (A.F. Alba) 1 month, M23 for non-target analysis; S26: NIJZ (U. Blaznik), 1 month, M35, introducing methods for assessing the risk of residues in food.

**ESR Profile and requirements:**

- Academic Master recognized by the EU in one of the following disciplines: Analytical Chemistry, Environmental Chemistry, Chemistry, or Food Sciences.
- Outstanding academic study performance.
- Expertise or knowledge of analytical chemistry, particularly in separation sciences and mass spectrometry, data management and statistics. Strong interest in basic and applied research.
- You act with attention to quality and creativity. Critical thinking, highly motivated and independent.
- Flexible and able to work in a team in an international research environment.

## ESR 8

**Project Title:** Synthesis of “smart” polymer nanostructured materials for use in food research - WP3, WP2

**Host:** Aristotle University of Thessaloniki (AUTH), Chem./ Environ. Pollution Control Laboratory, Thessaloniki, Greece

**Supervisor:** Prof. Dimitra Lambropoulou

**Co-supervisors:** Prof. Dimitrios Bikiaris (AUTH)

**Enrolment in Doctoral degree:** Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece

**Context:**

In the last years, food safety authorities and researchers have paid great attention to chemical contaminants (e.g. pesticides, emerging contaminants, et c.) that may be present in food as a result of the various stages of its production, packaging, transport and storage or as a result of environmental contamination of air, soil and water. Hence, there is an urgent need for reliable and precise analytical methods enabling screening followed by confirmatory analysis for food evaluation. However, analysis of a complex matrix such as food is still challenging due to many interferences present, leading to erroneous results, making qualitative and quantitative analysis of target analytes difficult. In order to overcome these matrix effects, sample preparation is often required before further analysis of these contaminants. Such methods also need to be reliable, expeditious,





inexpensive, low solvent consumption, and environmentally friendly. In response, research in all branches of analytical science has been carried out; particularly, sample preparation techniques and strategies have been the subject of extensive investigation. Also, developing new materials has gained increasing research interest in sample preparation due to their desirable characteristics and advantages versus traditional and commercial sorbents. The task of this ESR will be to advance existing knowledge and methods for preparing “smart” polymer nanostructured materials (Molecularly Imprinted Polymers, MIP) and Super Adsorbent Polymers, SAP) with tailored properties and to combine their utility with the simplicity of sorptive extraction techniques for determining different groups of legacy and emerging contaminants in food and food wastes using advanced mass spectrometry techniques.

#### Objectives:

To synthesis smart polymer nanostructured materials for selective removal of bioactive compounds and compounds of emerging concern. Specific objectives are to:

- Provide a cost-effective extractive media based on MIP and SAP with enhanced thermal, chemical or mechanical stability.
- Determine target bioactive compounds and contaminants of emerging concern (pesticides, industrial chemicals etc.) in food and food wastes.
- Apply MIP and SAP for selective isolation and extraction for the target, suspect and non-target analysis using GC and LC Mass Spectrometry techniques (Orbitrap LC-MS, LC-MS/MS, GC-MS).
- Optimise experimental design using Multivariate Statistical Techniques (MST) based on a Design of Experiments (DoE) methodology.
- Compare novel materials with state-of-the-art commercially available sorbents and coatings in real-life applications connected to ESR7, ESR9 and ESR10.

#### Expected Results:

A novel multi-functional “Smart” **polymer nanostructured materials**: MIP and SAP materials (D3.2); MSI methods for MIPs and SAPs characterisation (M9); Synthesis of MIPs and SAPs (M10); **selective extraction and simultaneous determination of bioactive compounds and CEC in food and food wastes by using HRMS**

#### Planned secondments:

S27: TA (K. Tsarhopoulos), 2 months, M8 and M22, training in advanced MS analysis; S28: CSIC (R.A.Pérez/J.L Tadeo), 2 months, M10-11, knowledge and skills exchange for target, suspect and non-target analysis; S29: JSI (E. Heath), 4 months, M17-20, testing the smart MIP/SAP sorbents for quantitative analysis of CECs in collaboration with ESR7 and ESR10; S30: UA (A. Covaci) 2 months, M27-28, testing novel MIP sorbents for the quantitative analysis of one of the new chemicals identified by ESR9 at UA.

#### ESR Profile and requirements:

- Outstanding academic study performances according to ECST grading scale and recognised by the EU.
- Knowledge of environmental analytical chemistry, separation sciences, mass spectrometry, statistics, and bioinformatics.
- Interest in basic research, analytical chemistry, and human exposure to contaminants.

#### Additional Qualifications:

- Publications in scientific journals on environmental analytical chemistry and polymer science.
- Presentations at scientific conferences on environmental analytical science and polymer science.
- Proven knowledge of environmental analytical chemistry and chromatography techniques coupled to mass spectrometry.
- Proven knowledge of polymer science.
- Proven knowledge of Information Technology.
- Programming knowledge in R or Matlab environment.

## ESR 9

**Project Title:** Chemical food safety for novel foods of animal origin for human consumption - WP2

**Host:** University of Antwerp (UA), Toxicological Centre, Antwerp, Belgium

**Supervisor:** Prof. Adrian Covaci



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 956265.



**Co-supervisors/mentors:** Prof. Alexander van Nuijs and Dr. Giulia Poma (UA)

**Enrolment in Doctoral Degree:** University of Antwerp (UA), Antwerp, Belgium

**Context:**

The Toxicological Centre (TC) has extensive experience, analytical skills and instrumental capabilities related to the human biomonitoring and assessment of environmental and human toxicology, with an emphasis on legacy and emerging contaminants (including phthalates and flame retardants). The PhD student is expected to identify contaminants of emerging concern (CECs) in novel food commodities using non-target and suspect high-resolution mass spectrometric (HRMS) screening methods.

**Objectives:**

To identify emerging chemicals in novel food commodities using non-target and suspect screening methods. Specific objectives are to:

- Develop and harmonise analytical and bioinformatics workflows for non-target and suspect screening methodologies for determining new chemicals currently available in chemical databases
- Characterise emerging chemicals by high-resolution MS screening in novel foods for human consumption (edible insects, beehive products, new seafood products).
- Critically assess the performance of analytical platforms based on HRMS.
- Generate databases by chemometric processing of data to establish geographical patterns of CECs.
- Estimate chemical food safety of newly identified CECs in novel foods.

**Expected Results:**

Identification of unregulated and emerging CECs in novel foods(D2.3); Development of MS methods for determining CECs (M5); Comprehensive database of identified CECs (M6)

**Planned secondment(s):**

S31: TA (K. Tsarhopoulos), 5 weeks, M10-11, exposure of ESR to a private sector analytical enterprise, which use of similar MS technology; S32: FF (A. Johnson) 2 months, M15-16, training in food characterisation; S33: JSI (E. Heath), 2 months, M32-33, knowledge exchange to investigate country-differences in the patterns of new chemicals.

**ESR Profile and requirements:**

- You must hold an Academic Master recognised by the EU in one of the following disciplines: chemistry, food sciences, environmental sciences, biochemistry, biomedical or pharmaceutical sciences.
- The researcher must not have resided or carried out this/her main activity (work, studies, etc.) in Belgium for more than 12 months in the 3 years immediately prior to his/her recruitment.
- Outstanding academic study performances according to ECST grading scale and recognised by the EU.
- Expertise or knowledge in analytical chemistry, particularly in separation sciences and mass spectrometry, statistics, bioinformatics. Strong interest in basic research, analytical chemistry, and human exposure to contaminants.
- Your research qualities are in line with the faculty and university research policies.
- You act with attention to quality, integrity, creativity, and cooperation.
- Flexibility and team spirit in an international research environment.

## ESR 10

**Project Title:** Alternative waste exploitation: contaminants of emerging concern in agricultural wastewater reuse - WP2

**Host:** Jožef Stefan Institute, Department of Environmental Sciences, Ljubljana, Slovenia

**Supervisor:** Prof. Ester Heath

**Co-supervisors:** Prof. Nives Ogrinc (JSI)

**Enrolment in Doctoral degree:** Jožef Stefan International Postgraduate School (JSIPS), Ecotechnology, Ljubljana, Slovenia

**Context:**

The Jožef Stefan Institute, Department of Environmental Sciences (JSI-O2) has over 20 years of experience



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developing and applying analytical methods for qualitative and quantitative determination of organic pollutant residues in environment-, health- and food-related matrices. The PhD student is expected to identify residues of contaminants of emerging concern (CEC) in model vegetables after applying wastewater for irrigation and treated sludge for fertilisation using target, suspect and non-target mass spectrometric screening methods.

#### **Objectives:**

To assess the reuse of wastewater and sludge for agricultural use and the nutritional value and safety of crops. Specific objectives are to:

- Develop analytical workflows (LC-MS/MS: target, suspect, non-target) for the determination of contaminants of emerging concern (CEC) residues in different matrices (soil, aq. phase, plant tissues).
- Characterise the presence of CEC residues in treated wastewater and treated sludge.
- Evaluate the uptake and distribution of CEC residues (parent compounds, metabolites, transformation products) in plant tissues (roots, stem, leaves) after application.
- Model plant uptake under different experimental condition.
- Evaluate the effects of treated wastewater and treated sludge on fruit quality attributes.
- Assess consumer risk from consuming plants irrigated with treated wastewater and grown in treated sludge amended soil.

#### **Expected Results:**

The candidate will deliver a thesis assessing agricultural irrigation with wastewaters and fertilisation with treated sludge concerning food quality and safety (D2.4); A MS methods for determining bioactive compound residues (M3); A MS methods for determining unregulated chemicals and chemicals of emerging concerns (CEC) (M5); Risk assessment on the use of crops irrigated with wastewater (M7).

#### **Planned secondments:**

S34: AUTH (D. Lambropoulou), 1 month, M9, exchange of knowledge and skills for the isolation and extraction of CEC and NFCs; S35: CSIC (D. Hernando), 6 months, M13-18 develop the skills of extraction of plant material and wastewaters and characterise micropollutant content and up-take; S36; TA (K. Tsarhopoulos), 1 month, M21 knowledge exchange on the new state-of-the-art techniques in mass spectrometric analysis; S37: NIJZ (U. Blaznik), 1 month, M35, introducing the methods for assessing the risk on the potential use of food residues.

#### **ESR Profile and requirements:**

As the candidate, you must have:

- A Master's degree recognised by the EU in chemistry, food sciences, environmental sciences, biochemistry, biomedical or pharmaceutical sciences.
- An outstanding academic study performance according to ECST grading scale and recognised by the EU.
- Expertise or knowledge of analytical chemistry, particularly in separation sciences and mass spectrometry, statistics, bioinformatics., and an interest in performing basic research and human exposure to contaminants.
- Research qualities in line with the faculty and university research policies.
- Pay attention to quality, integrity, creativity, and cooperation.
- The ability to work independently and as a part of a team in an international research environment;

## **ESR 11**

**Project Title:** New chemical and bio-sensors for food quality and safety – WP3, WP1, WP2

**Host:** Institute for Environmental Protection and Sensors Ltd. (IOS), Maribor, Slovenia

**Supervisor:** Prof. Aleksandra Lobnik

**Co-supervisors:**

**Enrolment in Doctoral Degree:** University of Maribor (UM), Faculty of Mechanical Engineering, Maribor, Slovenia

#### **Context:**

The focus will be on developing an optical sensor for non-invasive detection of freshness, pesticides, various allergens in real-time and will primarily serve the food processing industry to assure product traceability and



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safety from the production line to the end-user. Optical sensor technology provides a viable alternative to electrodes and other chemical-sensing devices because it has low sensitivity to electromagnetic noise, compatibility with optical fibres, easily miniaturised, and does not require a reference cell.

**Objectives:**

To develop nano-based chemical/bio-sensor receptors for the determination of organophosphates, freshness, food quality.

**Expected Results:**

Nano- and bio-sensors for determining food quality and safety (D3.3); Sensor performance characterised (M8).

**Planned secondments:**

S38: BOKU (G. M. Guebitz), 3 months, M14-16, development of bio-sensors and immobilisation of enzymes on nanomaterials; S39: JSI (E. Heath), 2 months, M21-22, validation of developed sensors; S40: CSIC (D. Hernando/R.González), 2 months, M27-28, application of sensor for determination of pesticides in a real system – food waste.

**ESR Profile and requirements:**

The main requirements are to understand the process of sensor development, which involves interdisciplinary topics and includes knowledge of material and nanomaterial science, photonics, chemicals, optical indicators, analytical chemistry, and some basic knowledge of biology. This work aims to design appropriate bio-chemical sensors for organophosphates, food freshness, and food quality parameters.

## ESR 12

**Project Title:** The synthesis of smart biopolymer materials with nanostructured surfaces with antimicrobial, biocompatible, anti-adhesive properties - WP3

**Host:** Aristotle University of Thessaloniki (AUTH), Chem./ Environ. Pollution Control Laboratory, Thessaloniki, Greece

**Supervisor:** Prof. Dimitrios Bikiaris

**Co-supervisors:** Prof. Dimitra Lambropoulou (AUTH); Prof. Lidija Fras Zemljic (UM)

**Enrolment in Doctoral degree:** Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece

**Context:**

It is estimated that 1.2-1.5 billion tonnes of food is wasted each year globally, and the shelf life of food, its maintenance/conservation and safety is of high interest to everyone in the food chain, including producers and consumers. Several factors affect food shelf life like microbiological, chemical, biochemical, and physical (storage) conditions. For long-term storage, packaging is one of the most important factors which affect food preservation. New packaging materials, mainly polymers, are designed to protect food against chemical and microbiological contamination, optimise shelf life, and protect consumer health. These polymers should be free of any substances that could interfere or contaminate food, have high mechanical performance, be appropriate gas barriers, and have antimicrobial and antioxidant properties. In recent years, interest in biobased and fully biodegradable and biocompatible polymers as food packaging materials has increased. Furanate polyesters are the most important class of bio-based polymers derived from biomass or synthesised from biomass-originated monomers, which can be used as alternatives to fossil-based polymers. The annual production growth of biobased polymers is estimated at around 18-20% using renewable sources, thus reducing CO<sub>2</sub> emissions by 60-80% and the need for non-renewable energy use (NREU) at about 70%. Nanotechnology can contribute to this direction using new and smart nano-additives enhancing the properties of traditional food packaging materials. Additional techniques can also be applied on food packaging polymers, such as using nano-additives coatings to improve its permeability to gaseous compounds (water and oxygen), and specific micro/nano textured geometries can be designed, fabricated and replicated using nanoimprint lithography. These materials will further enhance the antimicrobial and antifungal properties of the food packaging surface, leading to improved food maintenance/conservation and safety.

**Objectives:**

To develop new biopolymer packaging material with antimicrobial and antioxidant properties. Specific objectives are to:

- Produce high purity 2,5-furandicarboxylic acid (FDCA) for the preparation of bio-based polyesters using





diols like ethylene glycol, propylene glycol and butanediol as packaging material.

- Study the addition of nano-additives with antimicrobial properties by in situ polymerisations.
- Characterise smart biopolymers (molecular weight and physical properties: thermal, mechanical, the degree of crystallinity, solubility, gas barrier, toxicity and antimicrobial properties).
- Determine the safety and migration of smart polyester residues (monomers, decomposition byproducts) into foods or carbonated drinks and juices using LC-MS and GC-MS.
- Up-scale for industrial application.

#### **Expected Results:**

A new biopolymer packaging material with antimicrobial and antioxidant properties (D3.4); Characterisation of smart biopolymer materials using MSI methods (M9); Synthesis of monomers and polyesters including nano-additives (M10).

#### **Planned secondments:**

S41: UM (L. Fras/O. Plohl /Z. Peršin), 2 months, M17-M18 to investigate interactions between polymer matrix and inorganic nanoparticles using a quartz crystal microbalance (QCM) technique; S42: AHat (L. Tourasanidis), 2 months, M13 and M28, up-scaling of production technologies to industrial application and commercialisation; S43: M4I (B. Cillero Pastor) 4 months, M20-M23, nano-TOF SIMS analysis for packaging surface characterisation and interaction with food components. Bacterial profiling (fast screening) by MALDI-MS.

#### **ESR Profile and requirements:**

- PhD Candidate must hold an Academic Master recognised by the EU in one of the following disciplines: chemistry or chemical engineering science, polymer science or material science.
- The researcher must not have resided or carried out this/her main activity (work, studies, etc.) in Greece for more than 12 months in the 3 years immediately prior to his/her recruitment. Compulsory national service and short stays such as holidays are not taken into account.
- Outstanding academic study performances according to ECST grading scale and recognised by the EU.
- Expertise or knowledge in polymer science, in particular in material synthesis and characterisation.
- Strong interest in basic research, organic and polymer chemistry.
- You act with attention to quality, integrity, creativity, and cooperation.
- Flexibility and team spirit in an international research environment.

#### **Additional Qualifications:**

- Publications in scientific journals on material and polymer science.
- Presentations in scientific conferences on material and polymer science.
- Proven knowledge of chemistry or chemical engineering or polymer or material sciences.
- Proven knowledge of material characterisation (e.g. XRD, FTIR, DSC, mechanical properties, etc.).
- The knowledge is substantiated by the relevant diploma thesis or relative courses of the course (analytical grade and if the title of the course does not directly lead the correlation, the analytical score will be accompanied by the description of the course in the Study Guide) or with a relative publication or with a relevant certificate.
- Interview.

## **ESR 13**

**Project Title:** Functional coatings for active packaging development - WP3

**Host:** University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia

**Supervisor:** Prof. Lidija Fras Zemljč

**Co-supervisors:** Prof. Dimitrios Bikiaris (AUTH); Dr. Klementina Pušnik Črešnar (UM)

**Enrolment in Doctoral Degree:** University of Maribor (UM), Faculty of Mechanical Engineering, Maribor, Slovenia

**Context:** Laboratory for Characterisation and Processing of Polymers (LCPP) is active within the Institute of Engineering Materials and Design at the Faculty of Mechanical Engineering, University of Maribor. The main expertise is toward the development of Functional Materials, including packaging materials. PhD student is expected to develop new active packaging material and advanced coatings/fillers using natural substances with antioxidative and antibacterial properties.



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**Objectives:**

Develop new PET/PP/PLA packaging material and advanced coatings/fillers using natural substances with antioxidative and antibacterial properties. Specific objectives will be to:

- Develop, manufacture and demonstrate a combined innovative and sustainable packaging solution based on active agents.
- Integrate nano-sensors for non-destructive sensing and real-time detection of critical species within food packs to monitor food quality and safety along the food supply chain (connected to ESR11).
- Perform a safety assessment in terms of chemical, toxicological and microbiological risks.
- Identify possible environmental issues.
- Demonstrate “real world” applicability for target foods, i.e. meat and cheese.
- Up-scale from the laboratory to the industrial demo pilot line.

**Expected Results:**

New PET/PP packaging and alternatively biodegradable PLA materials and advanced coating/fillers based on natural substances with antioxidative and antibacterial properties (D3.5); Characterisation of PET/PP and PLA packaging material with emphasis on surface properties and adsorption/desorption phenomena and migration study using MSI (M9); Functional coatings and fillers (M11).

**Planned secondments:**

S44: FC (A. Feltinski) 1 month M7, 2 months M33-34; study the consumer behaviour regarding smart packaging considering economic aspect; S45: AUTH (D. Lambropoulou), 2 months, M9-10, development of functional coatings based on hydrophobic chitosan and its characterisations; S46: M4I (B. Cillero Pastor), 2 months, M19-20, analysing surface properties of functionalised surfaces as well as adsorption/desorption phenomena using advanced MSI; S47: IOS (A. Lobnik), 1 month, M28, integration of sensors in packaging material; S48: AHat (L. Tourasanidis), 1 month, M31, up-scale of ESR laboratory knowledge to industrial demo pilot line.

**ESR Profile and requirements:**

- You must have an EU-recognized Academic Master in one of the following disciplines: Chemistry, Food Science, Materials Engineering, Environmental Science, Biochemistry.
- Excellent academic record according to the ECST grading scale and recognised by the EU.
- Expertise or knowledge in colloid chemistry, materials and biotechnology.
- Experience in the use of surface analytical methods and an overview of the state-of-the-art in novel packaging materials. Strong interest in basic research, colloidal chemistry and materials engineering.
- Your research skills are in line with faculty and university research guidelines.
- You act with quality, integrity, creativity and collaboration.
- You have experience in writing scientific articles.

## ESR 14

**Project Title:** Plastics in Seafood - WP1, WP3

**Host:** Universiteit Maastricht (UM-M4i), Imaging Mass Spectrometry, Maastricht, Netherlands

**Supervisor:** Prof. Ron Heeren

**Co-supervisors:** Dr. Berta Cillero-Pastor (UM-M4I)

**Enrolment in Doctoral degree:** Universiteit Maastricht (UM-M4I), Maastricht, Netherlands

**Context:**

The Division of Imaging Mass Spectrometry at M4i is one of the world leader institutes in high resolution molecular imaging of biological and material surfaces. The division targets the development and application of state-of-the-art mass spectrometry-based molecular imaging for biomedical research and food sciences.

**Objectives:**

Develop mass spectrometry imaging protocols for fast polymer characterisation and detection in seafood for use by regulatory bodies and policy-makers. Specific objectives are to:

- Perform surface characterisation of the most abundant plastic contaminants found in European fish and



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seafood using high mass/spatial resolution mass spectrometry (MALDI-MSI and nano-TOF-SIMS).

- Understand the interphase between plastic and biological tissues obtained from fish and seafood.
- Analyse protein profiles of tissues polluted by microplastics.
- Determine the risk to public health.

#### **Expected Results:**

MSI protocols for fast screening polymeric residues in seafood for use by regulatory bodies and policy-makers (D1.5); Rapid screening methods using MSI tools (M2); MSI methods for nanomaterial characterisation (M9).

#### **Planned secondments:**

S49: UA (A. Covaci), 2 months, M22-23, application of non-target and suspect screening approaches based on accurate mass high resolution mass spectrometry; S50: CSIC (D. Hernando/R.González), 3 months, M26-28, chemical modification analysis after plastic exposure; S51: Agilent (J. Escribano), 1 month, M31, training in the treatment of MS data with mass spectrometry software platforms.

#### **ESR Profile and requirements:**

- Background in Analytical Chemistry, Biochemistry, Food Sciences, Environmental Sciences, Pharmacy or similar.
- Experience with mass spectrometry, Synthetic polymer analysis, mass spectrometry imaging, liquid chromatography and bioinformatics.
- Experience with microplastic extraction and analysis.
- Strong interest in human exposure to contaminants.
- Outstanding academic study performance.
- You act with attention to quality, integrity, creativity, and cooperation in an international environment;
- Critical thinking, flexible, highly motivated and independent.

## **ESR 15**

**Project Title:** Consumer awareness and perception – WP5, WP1, WP2, WP3

**Host:** WRG Europe Ltd, Exeter, United Kingdom

**Supervisor:** Dr. Vicky Edkins

**Co-supervisors:** Prof. Nives Ogrinc (JSI)

**Enrolment in Doctoral Degree:** Jožef Stefan International Postgraduate School (JSIPS), Ecotechnologies, Ljubljana, Slovenia

#### **Context:**

Consumer preferences and acceptance (alongside national and international policy frameworks) are central drivers in adopting innovative new tools and methods within food production and food processing. Identifying these factors and describing the interplay between them will provide a broader understanding of these drivers. This work will enable the suite of tools and methodologies developed within FoodTraNet to be shaped, targeted, and aligned with consumer requirements, thus accelerating their potential adoption.

#### **Objectives:**

To establish new approaches and models for more efficient communication with consumers regarding food labelling claims, new food items, circular economy and the acceptance of new nanotechnologies. Specific objectives are to:

- Study traditional food in Europe, in the context of consumer preference, for example, concerning 'Protected Designation of Origin', 'Protected Geographical Indication' and 'Organic' labelling.
- Investigate the nature of the European food value chain, contributing to consumer trust, choice and increased sustainable consumption, thereby supporting the transition to a circular economy.
- Evaluate industry and consumer acceptance of innovative, user-driven packaging solutions and overcome market uptake barriers.

#### **Expected Results:**

New approaches and consumer communication models regarding food labelling claims, novel food, circular



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economy and the use of nanotechnology (D5.1); An analysis of consumer awareness and perception (M12).

#### Planned secondments:

S52: FEM (L. Bontempo), 1 month, M13, consumer awareness of PDO products, cultural constraints; S53: UWM, FC (M. Grzybowska-B), 2 months, M20-21), assessment of consumer awareness in relation to alternative, new food, reuse of food waste; S54: UM (L. Frasz), 2 months, M33-34, consumers and packaging solutions; S55: JSI (M. Humar, N. Ogrinc), 2 months, M35-36, investigation of consumer feedback regarding the use of new photonic barcodes.

#### ESR Profile and requirements:

- Experience in data collection and collation of large data sets.
- Experience in statistical analysis and identification of relevant trends.
- Excellent communication skills (both written and verbal).

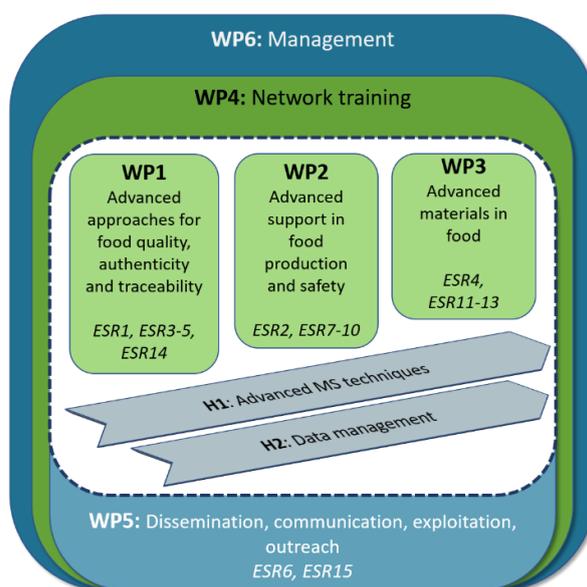


Figure 2 FoodTraNet Work Packages



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