



Smartphone analyzers for on-site testing of food quality and safety

Issue 1 – June 2017



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Welcome to the first FoodSmartphone e-Newsletter!

Dear reader and FoodSmartphone follower,

We proudly present you the very first e-Newsletter of the Marie-Curie Initial Training Network 'FoodSmartphone'. The aim of this newsletter is to provide you with a brief summary of the project, the latest news, and most importantly, to introduce to you our recently recruited early stage researchers (ESRs), who are all very eager to make this project a great success. They just finished their first network-wide summer school on smartphone-based assay development which was jointly organized by the Wageningen University graduate school VLAG and FoodSmartphone beneficiary RIKILT. Apart from our ESRs, 20 other international PhD students joined this exciting course. Keep updated by signing up on our website and/or by following us on twitter (@FoodSmartphone) and tweet us using the hashtag #FoodSmartphone. Feel free to contact us at foodsmartphone@foodsmartphone.eu with any suggestions for improvement of this e-Newsletter, for future collaboration or dissemination opportunities, or just for a friendly chat.



For now I wish you all very nice summer holidays!

Michel Nielen, coordinator

The FoodSmartphone project in a nutshell

Key facts:

Grant Agreement:

720325 –
FoodSmartphone -
H2020-MSCA-ITN

Start date:

January 2017

Duration:

48 months

Volume:

2.8 M€

Coordinator:

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Imagine how many random and suspect samples are being taken in national monitoring plans within the European Union (EU) for food quality and safety testing: millions each year again and again. Typically, all these samples are taken on-site at farms, slaughterhouses, border inspection points, retail shops, etc., documented, transported to a control laboratory, screened for target substances such as food contaminants and drug residues, and finally the few suspects from the screening methods have to be confirmed by validated instrumental methods in order to declare the sample non-compliant or compliant. Despite all these efforts, we are still facing frequent food incidents and fraud issues. A paradigm shift in food quality and safety testing is required in order to free resources for an intensified combat against fraud in the food chain. As an enabling technology solution to the problem, FoodSmartphone proposes the development of smartphone-based (bio)analytical sensing and diagnostic tools, for simplified on-site pre-screening of quality and safety parameters and wireless data transfer to servers of relevant stakeholders. Bioanalytical chemists, biologists, physicists, micro/nanotech engineers, mathematicians, organic- and food chemists will work together on the joint supra-disciplinary goal. FoodSmartphone offers the 11 ESRs an extensive programme of network-wide training events and intersectoral secondments. The scientific training in novel smartphone-based technologies plus the complementary skills training provided, will have a major impact on future EU monitoring practices and, moreover, pave the road for Citizen Science.

Overall objectives of FoodSmartphone:

- To study the supra-disciplinary challenge of smartphone-based analysis systems having advanced biorecognition, signal transduction, microfluidic sample handling and image data handling solutions.
- To develop user-friendly, rapid integrated sample preparation and smartphone-compatible Apps, to ultimately ensure adequate field implementation for both professionals and future Citizen Science.
- To develop a unique range of smartphone-based on-site screening demonstrators





for food quality and safety issues of concern, viz. for pesticides, allergens, mycotoxins, food spoilage organisms and marine toxins.

- To deliver, through high level training, a group of multidisciplinary scientists who can integrate (bio)analytical chemistry, physics, micro-engineering and ICT knowledge into a common supra-disciplinary goal, to combat major socio-economic challenges, such as maintaining a healthy, safe and fair food supply.
- To substantially improve the career prospects of early-stage researchers across academia, public research institutes and private industry sectors, including SMEs.

The project started with a 6 months recruitment period followed by the first network-wide summer school; the actual R&D program of FoodSmartphone starts about now. The project is organized in a matrix structure of 11 individual ESR projects (see below) and 5 cross-cutting work packages; the latter will be described in the next newsletter.

Feature: FoodSmartphone Summer School highly successful



The first summer school on *Smartphone-based Assay Development* took place in Wageningen, The Netherlands, June 26-30, 2017. This summer school was mandatory for the 11 ESRs but also open to other PhD students from both the academic and private sectors. In total, **32 students** and researchers from 12 countries and 21 different nationalities participated in this course. The course was composed of lectures, working groups, labwork, a cross-cultural communication workshop and finished with a most inspiring guest lecture on *Sensing and Diagnostics through Computational Photonics* by **prof. Aydogan Ozcan** from UCLA (USA). Following a 'setting the scene session' in which the EU food monitoring policy, the EU Rapid Alert System for Food and Feed (RASFF) and EU validation schemes were introduced, a range of scientific topics from surface chemistry, physical chemistry, biochemistry, analytical chemistry, microfluidics, engineering and software design were covered. Apart from these key lectures on specific building blocks and techniques relevant for smartphone-based food analysis, several cases were discussed from smartphone literature. The common scientific knowledge base was complemented with transferable skills training such as in critical reading and debating literature, presentations following labwork, organization skills through the establishment of an ESR council and communication skills.

Get to know our recently recruited FoodSmartphone ESRs

FoodSmartphone is very pleased to report that all ESRs have been recruited by the host organizations and are ready and eager to start their highly exciting training and research program. Here we give them a floor to introduce themselves!



Affordable FoodSmartphone assays for allergens

ESR1: Georgina Ross, RIKILT, Wageningen University & Research, The Netherlands

Gina Ross is a PhD candidate working within RIKILT in Wageningen on allergens and immunoassays. Gina is an MSc in forensic toxicology and has experience working with and designing lateral flow immunoassays for food contaminants. Gina's hobbies include swimming, reading and exploring new areas. She is also passionate about herpetology (the study of reptiles) and can be often found telling people about her pet snake.



Confirmatory analysis by mass spectrometry

ESR2: Vincent O'Brien, RIKILT Wageningen University & Research, Netherlands

My name is Vincent O'Brien and I am an analytical chemist originally from Ireland. I'm moving to the Netherlands to work at Wageningen University on the FoodSmartphone project. My work focuses on the coupling of a high resolution mass spectrometer to screening assays via ambient ionization for confirmatory analysis. Experienced on a variety of techniques I have now decided to focus on mass spectrometry as the central technology of my thesis. There is no better place than right here at RIKILT to get hands on experience with the most advanced mass spectrometry techniques available. I am excited to contribute to this EU project as it will bring about a major shift in how we analyse the food we eat every day! When not in the lab you will usually find me out with my friends or in the middle of reading a sci-fi novel.



Plasmonic FoodSmartphone assays for marine toxins

ESR3: Jordi Nelis, Queen's University, Belfast, United Kingdom

After obtaining a bachelor degree in general biology, Jordi followed his dream to discover more of the world and worked as an independent event organizer for 7 years in Europe. After this time he plunged back in biology and chemistry and completed a Master in biotechnology, specializing in proteomics, in the north of France, Lille. During his master he mainly worked on the characterization of protein interactions and the development of novel tools for real time analyses. Now he is starting a new challenge in combining these features for the development of a new smartphone based platform for rapid label free detection of marine bio-toxins.



Plasmonic FoodSmartphone assays for food spoilage

ESR4: Javier Lou Franco, Queen's University, Belfast, United Kingdom

Javier Lou Franco is a PhD candidate working at Queen's University Belfast, at the Institute for Global Food Security. His work within the European FoodSmartphone project is supervised by Dr Cuong Cao and Prof Christopher Elliott. Javier has a strong background in Biotechnology, although later on he specialized in Nanotechnology applied in the biological field. His research interests are focused on biosensing applications, usually combining bio and nanotechnological elements. Beyond developing nanodiagnostic tools to apply them in several fields (such as health or food analysis), he enjoys sports, travelling and reading.



Image data analysis on FoodSmartphones

ESR5: Yunfeng Zhao, Queen's University, Belfast, United Kingdom

Yunfeng Zhao is a PhD candidate, supervised by Dr. Huiyu Zhou, working on Image Analysis at Queen's University Belfast. He has a background of Computer Science. He is experienced with cloud base platform engineering and 3D modeling software developing. He is very interested in Image Analysis and Biological Science.



Enzymatic FoodSmartphone assays for AChE inhibitors

ESR6: Aristeidis Tsagkaris, University of Chemistry and Technology, Prague, Czech Republic

Aristeids S. Tsagkaris is from Greece and is 25 years old. He has M.Sc. in Agricultural Engineering & Agricultural Science and M.Sc. in Analytical Chemistry. His master thesis "Honey Authenticity: Development and validation of a UPLC-ESI-QToF MS method for the determination of phenolic compounds" highlighted the importance of phenolic compounds for the discrimination of geographical and botanical origin of honey. Currently he is a full-time PhD candidate in University of Chemistry and Technology in Prague and a Marie Curie "FoodSmartphone" Early Stage Researcher. His research focuses on the rapid screening of pesticides using an AChE assay combined with μ PADS and the use of smartphone digital camera for colorimetric detection.



Multiplex binding array designs for FoodSmartphones

ESR7: Raheel Ahmad, CSIC, Barcelona, Spain

My name is Raheel Ahmad and belongs to Pakistan. Due to my on going interest in Chemistry and Biology in general since high school days, I got admitted to BSc program in Chemistry with specialization in analytical and organic Chemistry. After completing two years study in Chemistry I got enrolled in BS Chemical Engineering program and received my further undergraduate degree from the University of Engineering and Technology (UET) Lahore, Pakistan in 2014 with Dean's Honour Roll. Furthermore, I got MSc-research based fellowship from Korea Advanced Institute of Science and Technology (KAIST), South Korea in 2014.



Electrode arrays for FoodSmartphones

ESR8: Klaudia Kopper, CSIC, Barcelona, Spain

My name is Klaudia Kopper, I am going to work on the development of electrode arrays for multiplex smartphone assays at the Nanobiotechnology for Diagnostics research group in Barcelona, Spain. I am from Budapest, Hungary, I got my Master's degree in biochemical engineering at the Budapest University of Technology and Economics. My main research interests are in the fields of molecular biology, immunology, food biochemistry and analytical chemistry. I am very excited to be participating in the FoodSmartphone project as an early stage researcher, as it will allow me to work in a really nice environment alongside ten other enthusiastic researchers from all over the globe.



Plasmonic imaging FoodSmartphones

ESR9: Sahl Sadeghi, Linköping University (LIU), Sweden

Sahl Sadeghi is a PhD candidate working in the Optical Device Laboratory, led by Prof. Daniel Filippini research group at Linköping University. Sahl is a mechanical engineer, and has a MSc degree in material science and engineering from Sabanci University, Turkey and is in the process of obtaining his second MSc in mechatronics engineering. Sahl's main interest is to design analytical micro/nano devices to study biological systems. Apart from his professional interests, he is fond of philosophy, psychology, history and economy. Sahl's hobbies usually include reading, trekking, and swimming as well as bicycle design.

Nano sample preparation for FoodSmartphones

ESR10: Andriy Kuzmyn, Aquamarijn, The Netherlands

My name is Andriy Kuzmyn. I completed my Master degree in Biotechnology at Lviv Polytechnic National University. During my studies, I have gained comprehensive experience in fields of the biochemistry biophysics and polymeric chemistry. After graduation, I have continued my research career in Czech Academy of Science Institute of Macromolecular Chemistry (IMC), Department Biomaterials and Bioanalogous Systems. Being a scientist is probably the coolest job of all. You are never get bored you are coastally exploring new and amazing. I am grateful to Aquamarijn Micro Filtration BV for providing me with opportunity do amazing project that will be helpful for community and will be a great challenge for my scientific skills and imagination.

FoodSmartphone assays for aflatoxins

ESR11: Safiye Jafari, CSEM, Switzerland

My name is Safiye Jafari and I am going to work on FoodSmartphone assays for aflatoxins screening at CSEM, Landquart, Switzerland. Originally, I am from Afghanistan. I got my master degree in applied chemistry from University of Tehran where I worked on the development of an electrochemical DNA biosensor. My main research interests are electrochemistry, bioanalytical chemistry, biosensing.



Forthcoming events / meetings



8th International Symposium on Recent Advances in Food Analysis (RAFA 2017)

7-10 November 2017, Prague, Czech Republic

Belfast Summit on Global Food Integrity (ASSET 2018)

29-31 May 2018, Belfast, Northern Ireland, UK

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