



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

Issue 7 – June 2020



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 720325.

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Welcome to the seventh FoodSmartphone e-Newsletter!

Dear reader and FoodSmartphone follower,

Nothing about viruses in my previous e-newsletter of December 2019, no clue whatsoever about the global impact of covid-19 at that time. What a change in just a few months: sadly deceased, entire societies and economies in lockdown, hampered food supplies, hoarding consumers. For us as European scientists we are facing different national approaches and policies. In many countries university labs closed down completely for months, while in others PhD students may do their lab work provided they comply with social distancing rules. For a collaborative initial training network such as FoodSmartphone, covid-19 caused the cancellation of many scheduled ESR secondments, postponement of our final network event and open day, reduced dissemination opportunities due to worldwide cancellations of scientific events, and last but not least, a lot of stress for our researchers in their final project year. How to finalise your paper(s) and your PhD thesis without having access to a lab? Being creative, many of our ESRs started writing collaborative review papers and opinions and/or parts of their thesis, still hoping that their lab situation will gradually improve in summer. Despite all this, you can read in this newsletter several successful adaptation stories. For example, our partner organisation Barilla turned their industrial business course into an online course for our ESRs and ESR Jordi Nelis successfully defended his PhD thesis online at Queens University in Belfast. Most likely more examples to follow in the coming months!

Don't forget to read the ESR stories in their weekly blogs at www.foodsmartphone.blog and, of course, their latest open access research papers on the dissemination page of the FoodSmartphone website. Or simply stay tuned by following us on twitter (@FoodSmartphone) and tweet us using the hashtag #FoodSmartphone. Feel free to contact us with any suggestions at foodsmartphone@foodsmartphone.eu for improvement of this e-Newsletter, for future collaboration or dissemination opportunities, or just for a friendly chat.

For now I wish you some creative summer holidays and, most importantly, stay safe!



Michel Nielen, coordinator

FoodSmartphone progress versus research objectives

Key facts:

Grant Agreement:

720325 – FoodSmartphone - H2020-MSCA-ITN

Start date:

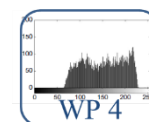
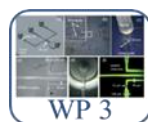
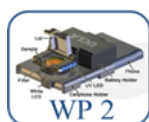
January 2017

Duration: 48 months

Volume: 2.8 M€

Coordinator:

Prof. Michel Nielen, PhD Wageningen Food Safety Research, Wageningen University & Research Wageningen, NL



The major science and innovation gaps to be addressed by the FoodSmartphone project relate to high-speed and novel biorecognition of food contaminants, novel optical and electrochemical detection schemes in conjunction with smartphones, simplified microfluidic sample handling solutions that enable non-expert operation, advanced software architecture and the development of application demonstrators for food quality and safety issues of concern, viz. for antibiotics, pesticides, allergens, mycotoxins, food spoilage and marine toxins. Again a lot of progress has been made in the reliable reading of colorimetric assay signals by



Website:
www.foodsmartphone.eu
ESR Blogs:
foodsmartphone.blog
Twitter:
 @FoodSmartphone
Facebook:
 FoodSmartphone
YouTube:
 IXceX3TITzs



WP1 leader
 M.-Pilar Marco (CSIC)
WP2 leader
 Gert Salentijn (WFSR)
WP3 leader
 Jens Eriksson (LIU)
WP4 leader
 Karen Rafferty (QUB)
WP5 leader
 Jana Hajslova (UCT)

smartphones with or without the use of cardboard boxes or 3D-printed attachments to control ambient light conditions. While several lab experiments are seriously hindered or even impossible due to covid-19 lockdowns, the ESRs have been extremely productive in writing. The following recent papers are listed on our [website](#):

- ESR1, Gina Ross, wrote a research paper entitled "A Critical Comparison Between Flow-through and Lateral Flow Immunoassay Formats for Visual and Smartphone-based Multiplex Allergen Detection" which appeared in *Biosensors* (<https://doi.org/10.3390/bios9040143>).
- ESR 3, Jordi Nelis, and ESR5, Yunfeng Zhao, wrote a joint research paper entitled "a randomised combined channel approach for the quantification of colour and intensity based assays with smartphones which appeared in *Anal. Chem.* (<https://dx.doi.org/10.1021/acs.analchem.0c01099>).
- ESR6, Aris Tsagkaris, wrote two research papers, one entitled "Screening of Carbamate and Organophosphate Pesticides in Food Matrices Using an Affordable and Simple Spectrophotometric Acetylcholinesterase Assay" which appeared in *Appl. Sci.* (<https://doi.org/10.3390/app10020565>), and a second one entitled "Hybrid lab-on-a-chip injector system for autonomous carbofuran screening", that appeared in *Sensors* (<https://doi.org/10.3390/s19245579>).
- ESR3, Jordi Nelis, ESR11, Safiye Jafari, and ESR4, Javier Lou Franco, wrote a joint research paper entitled "The benefits of carbon black, gold and magnetic nanomaterials for point-of-harvest electrochemical quantification of domoic acid", that appeared in *Microchim. Acta* (<https://doi.org/10.1007/s00604-020-4150-x>).
- ESR3, Jordi Nelis, and ESR6, Aris Tsagkaris, wrote a joint review paper entitled "Smartphone-based optical assays in the food safety field" that appeared recently in *TrAC Trends in Anal. Chem.* (<https://doi.org/10.1016/j.trac.2020.115934>).
- ESR10, Andriy Kuzmyn, wrote a research paper entitled "Antifouling Polymer Brushes via Oxygen-Tolerant Surface-Initiated PET-RAFT" in *Langmuir* (<https://pubs.acs.org/doi/10.1021/acs.langmuir.9b03536>).

Several other research and review papers are in the approval and submission pipeline!

Feature: Barilla's online industrial business school

WP6 leader
 Katrina Campbell (QUB)
WP7 leader
 Jana Pulkrabova (UCT)
WP8 leader
 Michel Nielen (WFSR)



One of the partner organisations of FoodSmartphone is the Italian food industry Barilla. They offered the project to organise in Parma an industrial business training course for the ESRs, but then covid-19 emerged. Barilla did a fantastic job in adapting to the new situation and, despite many local restrictive measures, they managed to offer and organise a 4-days networkwide training course entirely online. The course started with two presentations about regulations. Giorgia Andreis, a lawyer, spoke about the EU regulations on food, responsibility, traceability, the RASFF tool, and the food safety & fraud legislations. After her speech, Claudio Boi, senior-manager at Eurofins lab, focused his presentation on specific molecules, their regulations, legal limits, official methods, etc. He would like to refocus scientists' attention to develop methods based on regulatory limits and requirements. The contaminants discussed included mycotoxins, pesticides, heavy metals, veterinary drugs, process contaminants (acrylamide), food contact materials and emerging contaminants such as (mineral oils and pyrrolizidine alkaloids). On day 2 and 3 the training was focused on soft skill management with Chiara Barbieri and Cristiana Bonsignore from FranklinCovey. "The five choices to extraordinary productivity" aimed to become more proactive and to better organise life time. By selecting and applying these rules, people could save energy, be less stressed and more productive both in their professional and personal life. The "smart communication" session provided techniques to become more efficient in daily communication, also with

the help of different virtual instruments. The final day was focused on Barilla's way of working. Antonio Nespoli introduced the quality system of Barilla: its quality and food safety strategy, approach to risk assessment, how to evaluate scenario's for monitoring of emerging risks and food fraud issues. Alessandro D'Alessandro focused on the role of the R&D lab to support the needs of QC labs, illustrated by three case studies (pasta, biscuits and basil). Finally, Michele Suman discussed mycotoxin issues and Barilla's strategy to manage this risk to be ready for the harvest campaign. The course received very enthusiastic and positive feedback from our early stage researchers. A big thank you to Michele Suman, Roberta Pellesi and co-workers at Barilla, you did a fantastic job!

First FoodSmartphone doctorate for Jordi Nelis at QUB



Development of smartphone hyphenated colorimetric, plasmonic and electrochemical biosensors for food contaminant detection

A Thesis submitted to the School of Biological Sciences, Queen's University Belfast

For the degree of DOCTOR OF PHILOSOPHY

By JOOST LAURUS DINANT NELIS (MSc) June 2020

QUEEN'S UNIVERSITY BELFAST

One of the key aims of an initial training network such as FoodSmartphone is to provide PhD training. On April 2nd 2020, Jordi Nelis successfully defended his PhD thesis entitled "Development of smartphone hyphenated colorimetric, plasmonic and electrochemical biosensors for food contaminant detection" at Queens University Belfast. Due to covid-19 restrictions the defence had to be organised online. The first two chapters of his thesis analyse the state-of-the-art in screening and confirmatory methods, EU food safety legislation and current research efforts in smartphone-based devices. In the third chapter an online biosensor database for food contaminant analyses is described and used to identify critical technology gaps. In chapter 4-7 experimental research is conducted which aims to further developing the technology identified in the previous chapters: an immunoassay based on plasmonic coupling of nanoparticles for the detection of domoic acid was conducted, and the potential of smartphone based image analyses of colorimetric assays was thoroughly assessed. In addition, an electrochemical immunoassay was developed for domoic acid detection in shellfish. Here the focus was on the performance of screen printed electrodes that were modified with various materials. After just three years of research, the output of Jordi has been impressive and of a very high level, so well done Dr Jordi, our congrats! Feel free to contact Dr Jordi Nelis for a pdf copy of his thesis at J.Nelis@qub.ac.uk



Welcome to Mrs Ingeborg van Leeuwen-Bol



Since January 1st 2020 Ingeborg is working at Wageningen Food Safety Research in the FoodSmartphone project as the successor of the former secretary Mr. Wim Beek. She started her career at Leiden University and moved to Wageningen University & Research in 1991, initially as a research technician at the department of toxicology but the last 20 years she worked as education coordinator at the PhD Graduate School VLAG. Since 2004 she also works for NuGO, an association of universities and research institutes having its focus on joint research in molecular and personalised nutrition, nutrigenomics, and nutritional systems biology. NuGO evolved from an FP6 network of excellence that ended in 2010. The association continued some of the activities, developed new ones and expanded activities globally. In her free time she loves walking her dog Paco, enjoys motor sailing, likes nature, reading and, of course, quality time with friends and family.

Quotes from FoodSmartphone ESRs on www.FoodSmartphone.blog



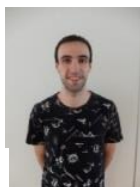
ESR1: Georgina Ross, WFSR, Wageningen University & Research, The Netherlands:
In FoodSmartphone of course we love scientific publications, but in reality, scientific publications remain largely that; publications by and for scientists. This means that we should keep you up to date with other dissemination activities, like blog-posts, popular science magazine articles (more to come on that in the coming month), and interviews.



ESR(1)2: Ariadni Geballa Koukoura, WFSR, Wageningen University & Research, The Netherlands:
Our contribution to the era of information is more crucial than we might think, and it's all our duty to try and improve the spread of fake news by using the power of our social media responsibly.



ESR3: Jordi Nelis, Queens University, Belfast, United Kingdom:
We can come together as one humanity and make drastic changes to our lifestyles for a common cause. Indeed 50% of the world's population is in some sort of lockdown now. And it is working. We are not of the hook yet but we are definitely starting to slow down the spread of this virus. So my message is: let's do the same for climate change!



ESR4: Javier Lou Franco, Queen's University, Belfast, United Kingdom:
Finally, I wanted to take this opportunity to acknowledge the hard work and involvement in the FoodSmartphone project of all the partners, it has been a great experience to be part of it and surely it will boost our careers as early stage researchers!



ESR5: Yunfeng Zhao, Queens University, Belfast, United Kingdom:
Though reassured that the FoodSmartphone dissemination would be a great opportunity for me to practice my presenting skills. As I needed to explain the rather abstract and complex concepts to middle school students within 20 minutes, I did not expect how enthusiastic the students would be after the dissemination.



ESR6: Aristeidis Tsagkaris, University of Chemistry and Technology, Prague, CZ:
The context of this blog is not to showcase my achievements, but to emphasize the significant effect on one's career and the numerous opportunities provided by MSCA.



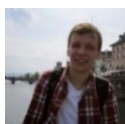
ESR(1)7: Julian Guercetti, CSIC, Barcelona, Spain:
The food industry started to play a key role during this pandemic. When all the stores were closing, pharmacies and supermarkets were the only ones allowed to work regularly, and with this we were able to appreciate how the food supply system is essential in a critical period". From COVID-19 on the menu?



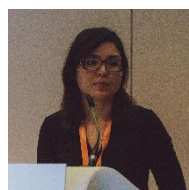
ESR8: Klaudia Kopper, CSIC, Barcelona, Spain:
Being part of a Marie Curie Training Network has helped me tremendously in working together with people that come from completely different cultural and disciplinary backgrounds. Even though we are a quite diverse group of people within the project, we were able to find a way to understand each other's needs and ways of communication and are able to work together while also respecting one another.



ESR(1)9: Chi Xiao, Linköping University (LIU), Sweden:
All these severe situations, make me feel like it is an epidemic that occurs in a history textbook. But at this time, it is not far from my life anymore, what we are experiencing.



ESR10: Andriy Kuzmyn, Aquamarijn, The Netherlands:
Editorial note: in June 2020 Andriy resigned from the project and consequently his final objective, the sample handling and applicability testing, will not be studied.



ESR11: Safiye Jafari, CSEM, Switzerland:
This past two months was quite a challenge to cope with lock-down restrictions and home-office working conditions. To stay productive, I was trying to dress up for the work and keep the same schedule. But soon I realized why not enjoy the flexibility that it brings, so I tried to make my schedule a bit more colorful with cooking, gardening, and going for a walk now and then. And for productivity, it wasn't all bad, I found out that it is much easier to focus on some tasks working from home, such as writing and reading.

Forthcoming events / meetings



Biosensors 2020

9-12 November 2020, Busan, Korea

Smart Tech for Food: FoodSmartphone Final Conference and Open Day 2020

25-27 November 2020, Girona, Spain

Rapid Methods Europe 2021

1-3 February 2021, Amsterdam, The Netherlands

EuroResidue IX

10-12 May 2021, Egmond, The Netherlands

EuroAnalysis 2021

22-27 August 2021, Nijmegen, The Netherlands

Recent Advances in Food Analysis (RAFA2021)

2-5 November 2021, Prague, Czech Republic

Contact us

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