

**DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY MENDEL UNIVERSITY
IN BRNO (MENDELU)**

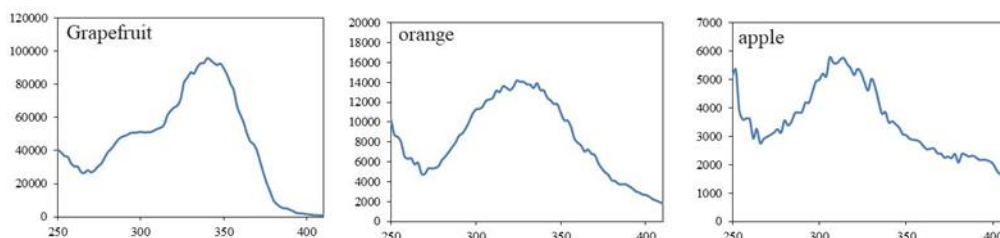
- 130 employees
- More than 750 m² of laboratories
- World-class instrumentation
- Part of the Central European Institute of Technology (CEITEC)

Research and development of advanced materials and approaches in physiology, biology, biochemistry and chemistry are the main vision of the abovementioned team. There are several laboratories dedicated to key areas such as bioanalytical chemistry, experimental microbial and animal biochemistry and biology, and, last but not least, algae and plant biotechnology and their utilization in agriculture, environment, functional food and plant protection. The instrumental equipment available enables the researchers to participate in a large number of grant projects at all levels – internal, national and international. Recent and current ongoing projects awarded by European Commission include:

- 2019-2023 - H2020. InteGRated systems for Effective ENviroNmentAl Remediation, GREENER
- 2018-2022 - Towards the Understanding a Metal-Tumor Metabolism, ERC Starting Grant, ERC-2017-STG, senior staff, budget 1 300 000 EUR
- 2017-2021 - H2020. Galileo Enhanced Solution for Pest Detection and Control in Greenhouse Fields with Autonomous Service Robots (776324-GREENPATROL)
- 2017-2018 - H2020 – 763685 Back for the Future (Back4Future)
- 2015-2016 - H2020-JTI-IMI2-2014-02-single, Ultra-Fast Molecular Filovirus Diagnostics „FILODIAG“, IMI2-2014-02-05, team member, budget 340 000 EUR
- 2012-2015 - Centre of excellence, Czech science foundation, Evolution and function of complex plant genomes. P501/12/G090.

Project idea: UV-fingerprinting for rapid, cost-effective and non-destructive testing of food products

UV-fingerprinting is a unique fluorescence-based method, which enables to distinguish samples of different natures and also genuine and modified (falsified, supplemented, spoilt/rotten/decayed) samples.

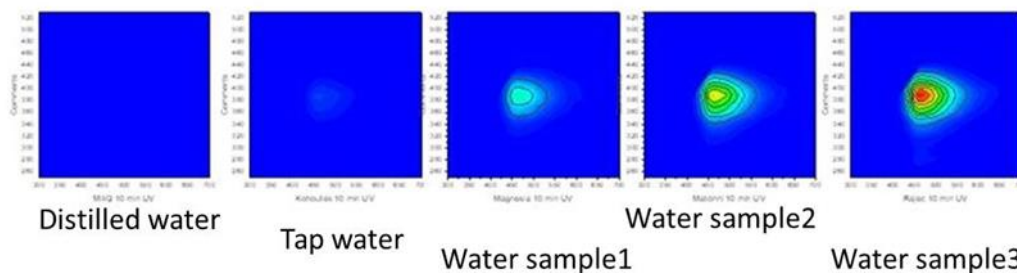


UV- fingerprinting for monitoring of technological processes

Water quality control

Water quality is extremely important e.g. in case of infant water also numerous producers (e.g. breweries) are highly concerned in monitoring of water quality (as changes in water quality are reflected in quality of their own product)

No substances other than carbon dioxide may be added to packaged infant or spring water. UV-fingerprinting enables to monitor undesired water additives or unwanted changes in water composition caused by aging, contamination etc. (see below)



Detection of food fraud/contamination

Organic food mislabeling

In order to increase the yields in agricultural production high amounts of chemicals (pesticides, antibiotics, etc.) are used by farmers.

Use of antibiotics – UV-fingerprinting enables to detect presence of antibiotic (so far tested using samples of honey artificially supplemented by selected antibiotics).

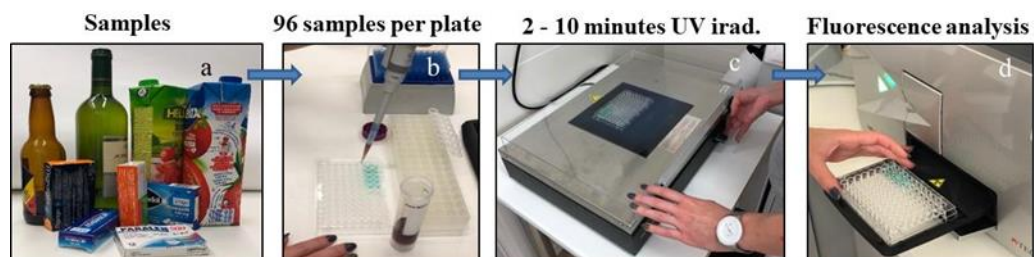
Several types of economically-motivated adulteration have been identified in the **honey** industry, including dilution with less expensive syrups, intensive supplemental feeding of honey bees, unapproved use of antibiotics, and masking the true country of origin.

(The use of antibiotics in beekeeping is illegal in some EU countries. Some countries, like Switzerland, UK, and Belgium, have established action limits (level of antibiotics in honey beyond which the sample is deemed noncompliant) for antibiotics in honey).

Use of pesticides - UV-fingerprinting enables to detect presence of pesticides (so far tested using samples of fruit sprayed by commercial pesticide solution).

Standard techniques used to detect contaminants are liquid or gas chromatography, mass spectrometry or other sophisticated techniques requiring demanding sample pretreatment and expensive instrumentation operated by highly educated personnel.

UV-fingerprinting is very cost-effective (1-50€ per analysis), time-effective (up to 100 samples can be analyzed within one hour). The sample consumption is very low (approx. 1 ml) and common, relatively inexpensive instrumentation (approx. 10,000 €) which can be operated with briefly trained person is required. Moreover, it can be easily miniaturized to a brief case size or hand-held instrument suitable for in-field analysis. The overall procedure is very simple (see below).



The instrument has been validated and is ready for miniaturization and upscaling.

Possible Horizon Europe calls:

- HORIZON-CL6-2022-FARM2FORK-01-04: Innovative solutions to prevent adulteration of food bearing quality labels: focus on organic food and geographical indications

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