

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

- 100 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:

- 2018-2022: ERC-2017-STG, “ToMeTuM”
- 2017-2020: H2020-GALILEO-GSA-2017, “GreenPatrol”
- 2017-2018: H2020-WIDESPREAD-04-2017-TeamingPhase1, Back4Future
- 2015-2017: H2020-JTI-IMI2-2014-02-single, “FILODIAG”
- 2009-2013: MAS, Nanoelectronics for mobile AAL-Systems, 7 FP ENIAC

Laboratory of bioanalysis and imaging:

Laboratory explores the use of nanomaterials in bioanalytical chemistry, especially light emitting particles and their usage for in situ detection of the presence of pathogens. Experimentally, the laboratory can perform *in vitro* and *in vivo* tests.

Project idea:

Fluorescent nanomaterials for optical detection

Partnership/cooperation possibilities:

Non-invasive diagnostics based on precise and reliable detection of biomarkers is not always applicable or may provide falsely positive/negative results and in such cases, imaging techniques provide additional, complementary or confirming information on the disease stage or progression. However, limitations such as exposition to the ionizing radiation or low sensitivity of the method have to be addressed. Fluorescence imaging offers numerous advantages including functional imaging, multiplexing and/or flexibility; however, the sensitivity is still low due to the low throughput through the tissue. This limitation can be solved by utilization of highly fluorescent contrast agents based on nanoparticles.

The aim of this project proposal is to provide a sensitive fluorescence *in vivo* imaging method utilizing a fluorescent nanoparticle-based contrast agent for detection of the presence of pathogens of *Phytophthora* genus. Our expertise lies mainly in synthesis of advanced materials with intensive fluorescent properties and high quantum yields. By conjugation of the nanoparticles with antibodies, we are able to target specifically the nanoparticle to the desired location or to the diseased plant tissue.

Moreover, the facility for fluorescence *in vivo* imaging is available for optimizing the imaging procedure and nanoparticle preparation.

Possible H2020 call:

SFS-05-2018/2019/2020 **New and emerging risks in plant health**

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