NEW PROJECT: Development of a breath analysis method for early cancer detection

Emphasis members Dr. Chrysafis Andreou and Dr. Agapios Agapiou, in collaboration with Dr. Yiorgos Apidianakis from the Department of Biological Sciences, have secured funding for a new project focused on early cancer detection. The grant will provide an individual fellowship for an incoming postdoctoral researcher through a Marie Skłodowska-Curie Action. It has a duration of two years.

The goal of the project is to identify how biochemical markers vary in the exhaled breath of individuals with different stages of colorectal cancer. To this end, the researcher will develop nanosensors for biomolecular detection of cancer-related volatile organic compounds in exhaled breath. Once completed, this work will demonstrate the feasibility of early cancer detection using breath screening instead of invasive colonoscopies. This methodology could help screen for other cancer types.

NEW PUBLICATION: Oil biodesulfurization: A review of applied analytical techniques

The review, published in the Journal Chromatography B, addresses the detection of sulfur components in liquid fuels. The main highlights of the review are:

- Environmental and health issues regulate the sulfur content in liquid fuels
- A review of applied analytical techniques for oil biodesulfurization is presented
- The major chromatographic methods are summarized
- The importance of chromatography and mass spectrometry is highlighted
- Green analytical technologies need to be further explored

The authors of this study are Dr. Marinos Stylianou and Dr. Agapios Agapiou, from the Department of Chemistry from UCY, and Dr. Ioannis Vyrides from the Cyprus University of Technology.

NEW PUBLICATION: Profiling soil volatile organic compounds after N fertilization in a soil grown with Rosmarinus officinalis

The paper, published in Applied Soil Ecology journal, addresses the biogenic volatile organic compounds (BVOCs) emissions from cultivated plants-soil systems and N fertilization’s role on these emissions. The latter work, is a research collaboration of Volatolomics Research Laboratory with Agricultural Research Institute.
OUR MISSION

To design novel electromagnetic structures, such as antennas and RF/microwave/mm-wave circuits and systems, which exhibit new phenomena and/or demonstrate superior performance characteristics compared to their conventional counterparts.

We aim to make valuable contributions to the fields of wireless communications, biomedical devices and imaging, radio-frequency identification, space/satellite systems, and wireless power transfer systems.

Marco Antoniades
PhD, SMIEEE
Director Microwaves and Antennas Laboratory,
Department of Electrical and Computer Engineering

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My work on adaptive antennas for 5G networks will pave the way for a completely interconnected world. THE FUTURE IS IN A WIRELESS INTERNET-OF-THINGS.

OUR TECHNOLOGIES

Compact reconfigurable metamaterial antennas and devices for next-generation broadband wireless communication systems. Designed for placement on realistic platforms (e.g., mobile phones, tablets), and are reconfigurable based on the demands of adaptive 5G networks.

Adaptive reconfigurable metasurfaces for the implementation of beam steering and absorption functionalities. Novel methods to reconfigure the adaptive metasurfaces are being investigated, including electronic, photonic and microfluidic techniques, in order to achieve active beam steering (user tracking) and interference mitigation in advanced wireless networks.

Compact and highly-efficient metamaterial antennas for implantable and wearable devices that form a part of larger bio-sensory networks. These can be used to wirelessly monitor data such as body temperature, heart rate, pH levels, blood oxygen levels and blood pressure.

FOR RECENT PUBLICATIONS PLEASE CLICK HERE
**PROJECTS**

1. **Metamaterial-Based Antenna for Wearable Applications**
   Designed on a semi-flexible substrate that allows structural deformation and platform-independent placement on the human body.

2. **Metamaterial-Loaded Antenna for Microwave Imaging**
   Compact and unidirectional antennas for radar-based microwave imaging system for torso imaging applications in the UHF frequency range of 0.5 – 1 GHz.

3. **Programmable Metasurfaces**
   A multifunctional metasurface design, enabled by a chip co-developed with the Holistic Electronics Research Laboratory of UCY. The chip programmatically loads the metasurface to produce multiple pencil beams.

**COLLABORATORS**

**FUNDING**
The goal of the RF-META project is to establish a distinct research unit focusing on the development of advanced RF electronics for use in adaptive metamaterial technology. Wireless is a critical and ubiquitous technology that is constantly evolving through generations (currently in its 5th), and in doing so has established itself as a vital pillar of the world economy. Given the continued trends in increased data volumes (Big Data), increased bandwidth and massive connectivity, there will be challenging requirements placed on hardware, and in particular on antenna design. This in turn requires a paradigm shift as in that proposed in this project, which is focused on the development of novel structures based on metasurfaces. Our aim is to establish a local eco-system in this disruptive technology that aligns with S3Cy priorities. This will allow Cyprus to develop a centre of excellence in this key enabling technology that will leverage future funding opportunities and provide scope for IP generation and spin-off company formation.

LAB MEMBERS

**PhD students:**
- Kypros Kossifos
- Kyriakos Neophytou
- Chrysovalantis Avraam
- Asif Bilal

**Masters students:**
- Panayiota Antoniou
- Charalampos Pavlou

**Affiliated researchers:**
- Abdul Qudidious (post-doctoral fellow)
- Haris Votsi (post-doctoral fellow)