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EMPHASIS RESEARCH CENTRE

Πανεπιστήμιο Κύπρου
University of Cyprus

EMPHASIS NEWS

NEWS AND ANNOUNCEMENTS:

NEW MEMBER!

SOTIRIOS CHRISTODOULOU is a Lecturer in the Dept. of Chemsitry

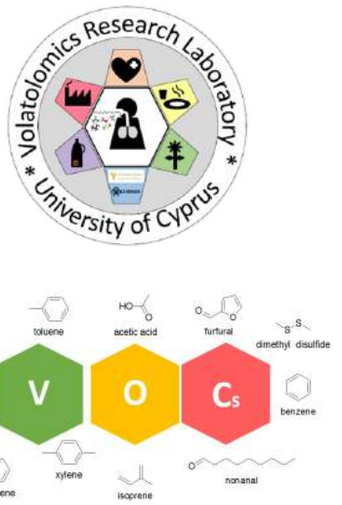
BSc in Chemistry 2012, Ph.D. in Nanosciences - Istituto Italiano di Tecnologia (IIT) 2016

His research is focused on the colloidal synthesis of 0D, 1D and 2D shaped semiconductor nanocrystals (II-V, II-V, IV-VI and perovskites). The research includes the design of nanoscale materials with novel properties and studies on their optoelectronic response using steady state and time-resolved photoluminescence spectroscopic techniques. Moreover, his is interested in coupling colloidal nanocrystals with cavities QED's towards weak and strong coupling for lasing applications in telecommunication wavelengths. The final research goal of his research is the fabrication of low-cost and high-efficient solution processable opto-electronic devices (e.g. solar cells, LED´s, lasers, detectors).

FEATURED LAB:

Message from the lab director

The Volatolomics Research Laboratory (VRL) was established on 11/2016 in the Department of Chemistry. It is a "sniffing" laboratory specialized to perform qualitative and quantitative analyses of odorous and non-odorous volatile components, biogenic or man-made, released in the atmosphere or enclosed environments. Among its capabilities, is the chemical analysis of the aerial fingerprint of human scent, formed by numerous volatile species released from tissues (skin, lungs) and biological fluids (sweat, urine, blood, etc.). The lab is mainly using hyphenated mass spectrometric instruments (e.g. GC-MS) along with advanced green preconcentration techniques (i.e. solid phase microextraction (SPME), and sorbent tubes (TD-GC-MS), to achieve the low concentrations levels (<ppb$_v$) of the released chemicals, related to the human exposome (e.g. occupational exposure chemicals, environmental stressors, pollutants, dietary sources, etc.), and food and beverages metabolites.



Agapios Agapiou, Ph.D.
Director Volatolomics Rersearch Laboratory

FOUR MAIN ACTIVITIES:

- **Biomedical applications:** exhaled breath, urine, blood, sweat, feces, breast milk, cancer VOCs, early diagnosis and monitoring of various diseases and metabolic disorders.
- **Environmental monitoring:** indoor/outdoor air quality, vaping (E-cigarettes), odor reduction (biochar) electrochemical processing of waste, plant emissions.
- **Food and beverages:** aroma analysis of carobs, coffee, extra virgin olive oil, wine, milk, whey milk, food and water pollutants (e.g. pesticides, trihalomethanes)
- **Waste and fuels analysis:** waste odor, microbial desulfurisation of oil.

OUR TECHNOLOGIES

Small molecules...enormous potential:

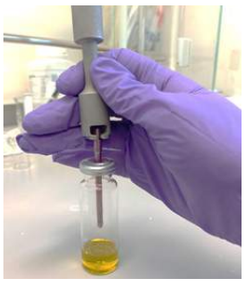
- In many foods (i.e. honey, wine) >95% of organic content consists of small molecules
- It is the basic subset that changes and differs by origin, type, or handling of food
- Some organoleptic properties are the result of small molecules; odor (volatile), and taste
- Nutritional intervention is reflected directly and precisely in the metabolic profile
- Part of the -omics cascade; reveal the underlying processes

THE ANALYTICAL ARENA

Thermal Desorption-Gas Chromatography\-Mass Spectrometry: The flagship hyphenated analytical system of VRL

The different available sampling options

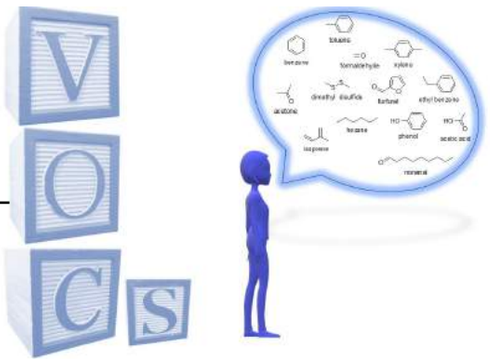
Solid phase microextraction-GC-MS (SPME-GC-MS)



HiSorb for thermal desoprtion-GC-MS (TD-GC-MS)

Cartridges fill-in with sorbent material for on-site sampling and TD-GC-MS analysis

Why... VOCs?



Volatile organic compounds (VOCs) are low-molecular-weight organic compounds that easily evaporate at room temperature.

VOCs are of interest to scientists as they are involved in atmospheric photochemical reactions that contribute to ozone production. Ozone is formed by chemical reactions involving airborne VOCs, nitrous oxide aerosols, and the presence of sunlight. In addition, VOCs play an important role in the formation of secondary organic aerosols. Finally, another very important factor that leads to their continuous study is the fact that some VOCs are harmful to human health.

MEMBERS

The VRL is currently composed of:

Dr. Agapios Agapiou
Director

Dr. Marinos Stylianou,
Postdoctoral researcher

Mrs. Kyriaki Kaikiti
PhD student

Mrs. Panagiota Fella
MSc. student

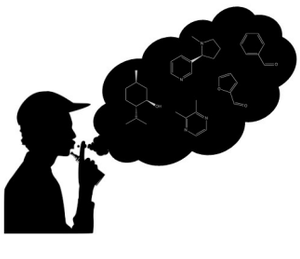
Mrs. Soteria Elia
MSc. student

Mrs. Chrystalla Kaikiti
MSc. student

Mrs. Photini Papaioakim
Undergraduate student

CURRENT RESEARCH

Current laboratory activities concentrate on the aroma analysis of wine, extra virgin oil, electrochemical treatment of whey waste, analysis of personal care products, and e-cigarettes.



FEATURED PROJECTS:

BlackGold
Science meets Industry

1 BlackGold

Duration: 2019-2022 (3 Years)

Type: INTEGRATED/0916/0019

Partners: UCY (Coordinator), SGL, ARI, Assia Mare LTD, Co-operative Carob Marketing Federation LTD, Polyxenis, Carob Products LTD, RTD TALOS LTD, SODAP LTD

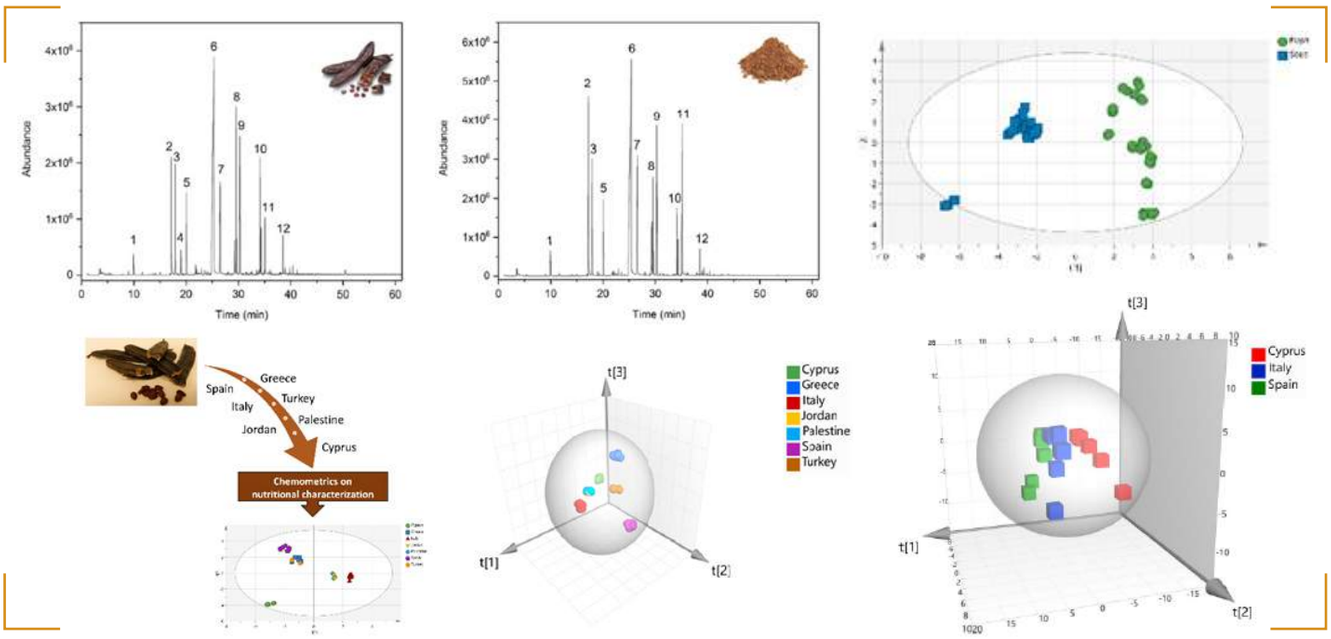
EUROPEAN UNION
European Regional Development Fund

Republic of Cyprus

Structural Funds
of the European Union in Cyprus

ABOUT:

VRL participates in the project as WP8 leader aiming to determine the volatile aroma profile of Cyprus carobs, as well as the biogenic VOCs emitted from Cyprus carob leaves, flowers, and respective products. Finally, a comparative study of local carob aroma with that of other countries will be performed.



2 Oil Eco Desulfur

Duration: 2019-2022 (3 Years)

Type: Post-Doc/0916/0121

Partners: Nortest LTD, UCY, CUT

NORTEST
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Cyprus University of Technology

PROJECT FUNDING

This work was co-funded by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation (OilEcoDesulfur: POST-DOC/0916/0121)
"RESTART 2016-2020"
RPF PROJECT NUMBER: POST-DOC/0916/0121
PILLAR II SUSTAINABLE RTDI SYSTEM
PROGRAMME: DIDACTOR (Post-Doctoral Researchers)

ΙΔΡΥΜΑ ΕΡΕΥΝΑΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΑΣ

Structural Funds
of the European Union in Cyprus

Internal Collaborators:

Cyprus University of Technology

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ΓΧΚ SGL

The Cyprus Institute
Research · Technology · Innovation

nireas
International Water Research Center

External Collaborators:

- **Greece:** University of Athens, Aristotle University of Thessaloniki, National technical University of Athens
- **Switzerland:** Swiss Federal University of Zurich (ETH Zurich)
- **United Kingdom:** University of Liverpool, University of Strathclyde
- **Austria:** University of Innsbruck
- **Czech Republic:** Czech University of Life Sciences Prague