

## **AIKATERINA PARASKEVOPOULOU**

### PERSONAL INFORMATION

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### EDUCATION AND TRAINING

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| Today             | Ph.D thesis on “Development of methods for the isolation and characterization of bioactive compounds from cyanobacteria biomass” (NTUA), in collaboration with Photo-Catalytic processes and Environmental Chemistry Lab of Institute of Nanoscience and Nanotechnology, NCSR “Demokritos”. |
| 10/2016 – 10/2018 | Master’s Degree on “Materials Science and Technology” (NTUA).<br>Postgraduate thesis with subject: “Synthesis and characterization of nanocomposite materials based on titanium dioxide for photocatalytic applications”.<br>Master’s Grade: 8.20/10  |
| 09/2009 – 02/2016 | Integrated Master on Chemical Engineering (NTUA).<br>Thesis on: “Optimization study for the recovery of bioactive compounds from the aromatic plant <i>Satureja thymbra</i> ”.<br>Grade: 7.02/10  |

### STUDIES

PhD Thesis

#### **“Development of methods for the isolation and characterization of bioactive compounds from cyanobacteria biomass”.**

Processing and optimization of methods for the extraction of phycocyanin from cyanobacterial biomass, through the application of different extraction techniques (simple and magnetic stirring, ultrasonic techniques, freezing and thawing techniques) and through the study of parameters affecting these processes.

Pre-treatment and optimization of  $\beta$ -carotene extraction techniques from cyanobacterial biomass, applying different solvents and extraction conditions. Subsequently, method development for the detection and quantification of  $\beta$ -carotene using High Performance Liquid Chromatography (HPLC - PDA) coupled with a photodiode detector.

Development of a protocol for the extraction and separation of bioactive compounds from cyanobacterial biomass. This protocol involves initial extractions using solvents of different polarity to obtain all the biomass components, followed by the separation of these compounds by subsequent liquid-liquid extractions using solvents of different polarities, and the final fractionation of the individual extracts by applying normal and reverse phase chromatography.

Development of a protocol to test the antioxidant activity of the cyanobacterial extracts against 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ABTS<sup>+</sup> radical.

Development of protocols to test the bioactivity of cyanobacterial extracts, using the appropriate enzyme assays (trypsin assay, thrombin assay, carboxypeptidase A).

Development of a protocol for the detection and identification of volatile organic compounds (VOCs) in cyanobacterial biomass. Extraction of these compounds using Head Space Solid Phase Microextraction (HS-SPME) and analysis by Gas Chromatography (GC) coupled with Mass Spectrometry (MS) using triple quadrupole technology (GC-MS/MS). Identification of VOCs using NIST MS library and NIST Chemistry Webbook SRD69 and further deconvolution and automatic identification of these compounds using open access software (Automated Mass Spectral Deconvolution and Identification System, AMDIS). Further identification of these compounds is done using Retention Indices (R.I.), as well as by verifying the elution time with that of the corresponding standard substance.

Postgraduate thesis

**“Synthesis and characterization of titanium-based nanocomposites for photocatalytic applications”.**

Development and optimization of a synthesis method of indium nitride (InN) nanoparticles using a sonochemical method, and calculation of their crystal size by high resolution transmission electron microscopy (HRTEM).

Method development for the decoration of the surface of titanium dioxide (TiO<sub>2</sub>) with InN, indium phosphide (InP) and gold (Au) nanoparticles, in order to test their effect on the photocatalytic activity of TiO<sub>2</sub>.

Study of the crystallinity of InN nanoparticles and TiO<sub>2</sub>/InN, TiO<sub>2</sub>/InN/Au, TiO<sub>2</sub>/InP nanocomposites by X-ray diffraction (XRD).

Screening of the photocatalytic activity of InN, InP, TiO<sub>2</sub>, TiO<sub>2</sub>/InN, TiO<sub>2</sub>/InP, and TiO<sub>2</sub>/InN/Au materials against methylene blue (MB) pollutant under UV-A irradiation. The results were processed using the Origin program.

Integrated master thesis

**“Optimization study for the recovery of bioactive compounds from the aromatic plant *Satureja thymbra*”.**

Extraction of the essential oil from the aromatic plant *Satureja thymbra* by applying hydro-steam distillation technique and further analysis of the essential oil by gas chromatography coupled with mass spectrometry (GC-MS).

Method development and optimization of the recovery of polyphenols from *Satureja thymbra*. Performing of conventional extraction methods (sequential Soxhlet extractions) using organic solvents of different polarities and extractions in alkaline environment.

Study of alkaline extraction using ultrasounds and optimization of this method by applying multi-parameter optimization methods (Box-Benken design) and appropriate data processing software (STATISTICA 7). The optimization parameter considered was the yield of polyphenols, the concentration of which was determined by the Folin-Ciocalteu method.

The extracts were analysed for their phenolic constituents by high-performance liquid chromatography with photodiode detector (HPLC-PDA) and were tested for their antioxidant activity against 2,2-diphenyl-1-picrylhydrazyl radical (DPPH).

WORK EXPERIENCE

06/2021–Today

**Research associate at the Doping Control Laboratory of Athens, Institute of Biosciences & Applications, NCSR "Demokritos", with subject: “Analysis of urine and blood samples and alternative biological samples of athletes for the detection of hormones and prohibited doping substances, by gas and liquid chromatography coupled to mass spectrometry”.**

Analysis of urine and blood samples and alternative biological samples of athletes for the detection of hormones and prohibited doping substances, using Gas Chromatography coupled with triple quadrupole mass spectrometry (GC-MS/MS) and Gas Chromatography Combustion Isotope Ratio Mass Spectrometry (GC/C/IRMS).

10/2020–Today

Research associate at the department of Chemical Engineering (NTUA).

02/2019–05/2021

**Working on the project: “Bioconversion of CO<sub>2</sub> into High-added Value bioproducts through sustainable microalgae cultivation processes”, Photo-Catalytic processes and Environmental Chemistry Lab of Institute of Nanoscience and Nanotechnology, NCSR “Demokritos”.**

Development of methods for the isolation and characterization of bioactive compounds from cyanobacteria biomass. More specifically, application of liquid-solid extraction

techniques (simple and magnetic stirring, ultrasonic techniques, freeze and thawing techniques) and liquid-liquid extraction, as well as development of a suitable protocol for the fractionation of cyanobacterial biomass extracts by applying Thin Layer Chromatography (TLC) and normal and reverse phase chromatography. Application of a method for the determination of terpenoids based on the use of High Performance Liquid Chromatography (HPLC) with photodiode array detector (HPLC-PDA). Application of Solid-Phase Extraction (SPE) techniques for the recovery of different groups of cyanotoxins from biomass samples. Development and application of high performance liquid chromatography techniques coupled with triple quadrupole mass spectrometry (HPLC-MS/MS) for the detection of complex organic molecules (cyclic peptides) with a reversed-phase chromatographic column and Hydrophilic Interaction Liquid Chromatography (HILIC-MS/MS) for the detection of amino acids (non-proteogenic amino acids) and alkaloid toxins. The identification and determination of these compounds was based on the monitoring of characteristic transitions of parent to corresponding ions (selected reaction monitoring, SRM), while the quantification of each substance was based on the use of standard compounds.

Application of Head Space - Solid Phase Microextraction (HS - SPME) technique for the extraction of volatile organic compounds from cyanobacterial biomass. Their detection and identification was accomplished using gas chromatography coupled with triple quadrupole mass spectrometry (GC-MS/MS).

10/2013–11/2013

**Internship at the General Chemistry of the Hellenic State, A' Chemical Service of Athens, with subject: "Analyses and quality tests on edible vegetable fats and oils, olive oils and olive-pomace oils".**

Analysis of olive oil samples for compliance with EU legislation on quality and authenticity parameters.

Application of volumetric and spectrophotometric techniques, as well as liquid and gas chromatography (HPLC-RI, GC-FID).

RESEARCH PUBLICATIONS

- N.A. Hammoud, S.-K. Zervou, T. Kaloudis, C. Christophoridis, **A. Paraskevopoulou**, T.M. Triantis, K. Slim, J. Szpunar, A. Fadel, R. Lobinski, A. Hiskia, "Investigation of the Occurrence of Cyanotoxins in Lake Karaoun (Lebanon) by Mass Spectrometry, Bioassays and Molecular Methods", *Toxins*, (2021), 13 (394):1-20.
- S.-K. Zervou, K. Moschandreu, **A. Paraskevopoulou**, C. Christophoridis, E. Grigoriadou, T. Kaloudis, T.M. Triantis, V. Tsiaoussi, A. Hiskia, "Cyanobacterial Toxins and Peptides in Lake Vegoritis, Greece", *Toxins*, (2021), 13 (716):1-21.
- Y. Vergou, M. Touraki, **A. Paraskevopoulou**, T. M. Triantis, A. Hiskia, S. Gkelis, " $\beta$ -N-methylamino-L-alanine Interferes with Nitrogen Assimilation in the Cyanobacterium, non-BMAA Producer, *Synechococcus sp. TAU-MAC 0499*", *TOXCON*, (2020), 185:147-155.

CONFERENCE PRESENTATIONS

- **A. Paraskevopoulou**, T. Kaloudis, A. Hiskia and T.M. Triantis, "Determination of Volatile compounds in Spirulina food supplements using HS-SPME – GC/MS". IMA 2021, 20-23 September 2021, Virtual Conference.
- **A. Paraskevopoulou**, T. Kaloudis, S. Gkelis, U. Lortou, M. Panou, A. Hiskia, T.M. Triantis, "Optimized methods for the extraction of C-phycoerythrin and  $\beta$ -carotene from *Arthrospira spp. (Spirulina)* and their application to microalgae isolated from Greece". Poster at IMA 2021, 20-23 September 2021, Virtual Conference.
- N. Hammoud, S.-K. Zervou, T. Kaloudis, **A. Paraskevopoulou**, C. Christophoridis, T.M. Triantis, A. Hiskia, J. Szpunar, K. Slim, R. Lobinski, "Investigation on the occurrence of cyanobacterial secondary metabolites in Lebanese lake Karaoun using mass spectrometry and molecular techniques". SETAC Europe 2021, 3-6 May 2021,

Virtual Conference.

- **A. Paraskevopoulou**, C. Argiris: “Synthesis and characterization of nanocomposite materials based on titanium dioxide for photocatalytic applications”. 12th Panhellenic Scientific Conference on Chemical Engineering, Evgenidou Foundation, 29-31 May 2019, Athens, Greece.
- **A. Paraskevopoulou**, A. Oreopoulou, D. Tsimogiannis and V. Oreopoulou: “Valorization of pink savory through essential oil distillation and alkaline extraction of phenolic compounds”. Poster at the 4th International ISEKI\_Food Conference, 6-8 July 2016, Vienna, Austria.
- **A. Paraskevopoulou**, A. Bimpilas, D. Tsimogiannis, V. Oreopoulou: “Optimization study for the recovery of bioactive compounds from the aromatic plant *Satureja thymbra*”. 10th Panhellenic Scientific Conference on Chemical Engineering, Conference & Cultural Center of the University of Patras, 4-6 June 2015, Patras, Greece.

## LANGUAGES

English  
French

Examination for the Certificate of Competency in English (ECCE, B1)  
Delf B1 – Institute Francais d’ Athenes.

