

ICP Laboratory
Department of Chemistry
University of Crete
Prof. Spiros A. Pergantis

Website: www.chemistry.uoc.gr/spergantis

Types of Analysis offered by the laboratory:

- Silver (Ag) speciation and characterization of Ag nanoparticles released from plastic food containers by single particle ICP-MS (Inductively Coupled Plasma Mass Spectrometry) (Published Methods)
- Determination of Sulphur (S) content in plastic materials using the ICP-OES technique (European Standard, Draft prEN 13206:2015).
- Standard Test Method for Lead and Cadmium Extracted from Glazed Ceramic Surfaces (ASTM C738 – 94:2011)
- Determination of total cadmium (Cd) in plastic materials (Validated Internal Method)
- Determination of Metals in ground waters, surface waters, industrial waters, sludges and soil samples by using ICP-MS (EPA Method 6020a)
- Determination of As, Pb and Sb in food products and packaging by ICP-MS (Validated Internal Method)

List of Instruments

NexION 300XX Inductively Coupled Plasma Mass Spectrometer (Perkin Elmer)

Series 2 Inductively Coupled Plasma Mass Spectrometer (Thermo Scientific)

iCAP 6000 series Inductively Coupled Plasma Optical Emission Spectrometer (Thermo Scientific)

Microwave Digestion System (Berghof)

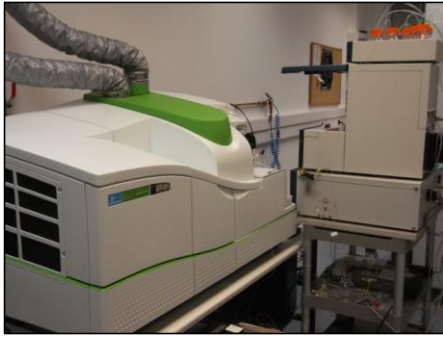
TSI Differential Mobility Analyser for nanoparticle detection

LCQ Advantage Ion Trap Mass Spectrometer (Thermo Scientific)

TSQ Quantum Triple Quadrupole Mass Spectrometer (Thermo Scientific)

Numerous HPLC systems (Thermo Scientific, Shimadzu, Agilent, Perkin Elmer)

Instrument Photos



NexION 300XX Inductively Coupled Plasma Mass Spectrometer (Perkin Elmer)



iCAP 6000 series Inductively Coupled Plasma Optical Emission Spectrometer (Thermo Scientific)



TSQ Quantum Triple Quadrupole Mass Spectrometer (Thermo Scientific)



LCQ Advantage Ion Trap Mass Spectrometer (Thermo Scientific)



TSI Differential Mobility Analyzer CPC detector



Microwave Digestion System (Berghof)



TSI Differential Mobility Analyzer with ICP-MS

Funding to ICP Laboratory

Project Title: Development of Advanced Mass Spectrometric Techniques for Detecting Metalloproteomes, Studying their Structure and their Interactions

Period: 2012-15 Duration: 36 months

Programme: SYNERGASIA (Cooperation)

Funding Source: General Secretariat for Research and Technology (GSRT), Ministry of Education, Greece

Principal Investigator: S. A. Pergantis

Funding: Total funding for 3 partners: 607,125 €

Funding for S. Pergantis group: 221,000 €

Project Title: Easy Ambient Sonic Spray Ionization – Mass Spectrometry

Period: 2011-12 Duration: 24 months

Programme: Small Research Grants, University of Crete, Special Account for Research

Funding Source: University of Crete, Special Account for Research

Principal Investigator: S. A. Pergantis

Funding: 2,500 €

Project Title: Development of Ion Mobility Spectrometry for the Determination of Size and Composition of Nanoparticles

Period: 2010-13 Duration: 36 months

Programme: HRAKLEITOS II

Funding for a PhD studentship

Funding Source: Ministry of Education, Greece

Principal Investigator: S. A. Pergantis (PhD fellowship for E. Kapellios)

Funding: 30,000 €

Project Title: Development, Evaluation and Application of Hydrodynamic Chromatography On-line with ICP-MS for the Detection of Manufactured Metal-containing Nanoparticles in Environmental Matrices

Period: 2010-11 Duration: 9 months

Programme: United States National Research Council Resident Senior Research Associateship Award

Funding Source: US National Research Council

Principal Investigator: S. A. Pergantis

Funding: \$ 75,000

Project Title: Development of Novel Carbon Nanotube Assisted Mass Spectrometric Techniques for the Determination of Ultra-trace levels of Metals

Period: 2007-08 Duration: 24 months

Programme: Research Grant Programme, University of Crete, Special Account for Research

Funding Source: University of Crete, Special Account for Research

Principal Investigator: S. A. Pergantis

Funding: 5,000 €

Project Title: Development and Application of Analytical Mass Spectrometric Techniques for the Determination of Selenium Species in Food Products

Period: 2005-07 Duration: 36 months

Programme: PYTHAGORAS II

Funding Source: Greek Ministry of Education

Principal Investigator: S. A. Pergantis

Funding: 50,000 €

Project Title: Development of Advanced Analytical Method for Determining Metal Species and Their Interactions in Environmental and Biological Systems (ACE-METALS)

Period: 2004-08 Duration: 48 months

Programme: Marie Curie Excellence Grant (MEXT-CT-2003-2788), FP6

Funding Source: European Commission

Principal Investigator: S. A. Pergantis

Funding: 857,321 €

Selected ICP Laboratory Publications in International Peer Reviewed Journals

1. "Using Nanoparticles to Determine the Transport Efficiency of Microflow and Nanoflow Nebulizers in Inductively Coupled Plasma – Mass Spectrometry" K. Kanaki, S.A. Pergantis, JAAS, 2016, DOI: 10.1039/C5JA00474H.
2. "Investigating the Occurrence and Environmental Significance of Methylated Arsenic Species in Atmospheric Particles by Overcoming Analytical Method Limitations" T.Tziaras, S. A. Pergantis*, E. G. Stephanou, Environ. Sci. Technol., DOI: 10.1021/acs.est.5b02328.
3. "Investigation of a Combined Microdroplet Generator and Pneumatic Nebulization System for Quantitative Determination of Metal-Containing Nanoparticles Using ICPMS" B. Ramkorun-Schmidt, S. A. Pergantis, D. Esteban-Fernández, N. Jakubowski, and D. Günther, Anal. Chem., 2015, 87 (17), 8687–8694, DOI: 10.1021/acs.analchem.5b01604 .
4. "Elemental and molecular mass spectrometry for integrated selenosugar speciation in liver and kidney tissues of maternal feeding and supplemented rats", H. González-Iglesias, M. Luisa Fernández-Sánchez, Y. Lu, S. Fernández Menendez, S. A. Pergantis, A. Sanz-Medel*, J. Anal. At. Spectrom., 2015, 30, 267-276.
5. "Concurrent quantitative HPLC-mass spectrometry profiling of small selenium species in human serum and urine after ingestion of selenium supplements" S. Kokarnig, A. Tsirigotaki, T. Wiesenhofer, V. Lackner, K. A. Francesconi, S. A. Pergantis, D. Kuehnelt*, Journal of Trace Elements in Medicine and Biology, 2015, 29, 83–90.
6. "Gender-specific distribution of selenium to serum selenoproteins: Associations with total selenium levels, age, smoking, body mass index, and physical activity" S. Letsiou, T. Nomikos, D.B. Panagiotakos, S.A. Pergantis, E. Fragopoulou, C. Pitsavos, C. Stefanadis, S. Antonopoulou*, BioFactors, 2014, 40, 5, 524–535.
7. "Bipolar Mass Spectrometry of Labile Co-ordination Complexes, Redox Active Inorganic Compounds and Proteins Using a Glass Nebulizer for Sonic-Spray Ionization" M. M. Antonakis, A.

- Tsirigotaki, K. Kanaki, C. J. Milios, S. A. Pergantis*, *J. Am. Soc. Mass Spectrom.*, 2013, 24, 1250-1259. Link
8. "LC-ICP-MS Analysis of Arsenic Compounds in Dominant Seaweeds from Thermaikos Gulf (Northern Aegean Sea, Greece)" A. Pell, G. Kokkinis, P. Malea, S. A. Pergantis, R. Rubio, J. F. Lopez-Sanchez*, *Chemosphere*, 2013, 93, 2187–2194.
 9. "Heavy metals, trace elements and sediment geochemistry at four Mediterranean fish farms" I. Kalantzi, T.M. Shimmield, S.A. Pergantis, N. Papageorgiou, K.D. Black, I. Karakassis*, *Science of the Total Environment*, 2013, 444, 128-137.
 10. "Metals and other elements in tissues of wild fish from fish farms and comparison with farmed species in sites with oxic and anoxic sediments" I. Kalantzi, K. D. Black, S. A. Pergantis, T. M. Shimmield, N. Papageorgiou, K. Sevastou, I. Karakassis*, *Food Chemistry* 11/2013, 141(2):680-694.
 11. "Hydrodynamic Chromatography On-Line with Single Particle Inductively Coupled Plasma – Mass Spectrometry for Ultratrace Detection of Metal-Containing Nanoparticles" S. A. Pergantis*, T. L. Jones-Lepp, E. M. Heithmar, *Anal. Chem.*, 2012, 84(15), 6454-6462.
 12. "A cyclam-type "turn on" fluorescent sensor selective for mercury ions in aqueous media" S. Voutsadaki, G. K. Tsikalas, E. Klontzas, G. E. Froudakis, S. A. Pergantis, K. D. Demadis, H. E. Katerinopoulos*, *RSC Advances*, 2012, 2, 12679–12682.
 13. "Quantitative selenium speciation in human urine by using liquid chromatography - electrospray tandem mass spectrometry" Y. Lu, A. Rumpler, K. A. Francesconi, S. A. Pergantis*, *Anal. Chimica Acta*, 2012, 731, 49-59.
 14. "Arsenic speciation in freshwater snails and its life cycle variation" V. W.-M. Lai, K. Kanaki, S. A. Pergantis, W. R. Cullen*, K. J. Reimer, *J. Environ. Monit.*, 2012, 14, 743-751 (Featured on Journal Front Cover).
 15. "Size and Elemental Composition of Nanoparticles Using Ion Mobility Spectrometry with Inductively Coupled Plasma Mass Spectrometry" E. A. Kapellios and S. A. Pergantis*, *J. Anal. At. Spectrom.*, 2012, 27, 21-24 (Featured on Journal Inside Cover).
 16. "Using Nano-electrospray Ion Mobility Spectrometry (GEMMA) to Determine the Size and Relative Molecular Mass of Proteins and Protein Assemblies: A comparison with MALLS and QELS" E. Kapellios, S. Karamanou, M. F. Sardis, M. Aivaliotis, A. Economou*, S. A. Pergantis*, *Anal. Bioanal. Chem.* 2011, 399, 2421-2433.
 17. "High Throughput Quantification of Selenium in Individual Serum Proteins from a Healthy Human Population Using High-Performance Liquid Chromatography On-line with Isotope Dilution Inductively Coupled Plasma – Mass Spectrometry" S. Letsiou, Y. Lu, T. Nomikos, S. Antonopoulou, D. Panagiotakos, C. Pitsavos, C. Stefanadis, S. A. Pergantis*, *Proteomics* 2010, 10, 3447–3457.
 18. "Dietary habits of Greek adults and serum total selenium concentration. The ATTICA study" S. Letsiou, T. Nomikos, D. Panagiotakos, S.A. Pergantis, E. Fragopoulou, S. Antonopoulou*, C. Pitsavos, C. Stefanadis, *European J. of Nutrition* 2010, 49, 8, 465-472.
 19. "Elevated Antimony Concentrations in Commercial Juices" C. Hansen*, A. Tsirigotaki, S. Bak, S. A. Pergantis, S. Stürup, B. Gammelgaard and H. R. Hansen, *J. Environ. Monit.*, 2010, 12, 822–824.
 20. "Selenosugar determination in porcine liver using multidimensional HPLC with atomic and molecular mass spectrometry" Y. Lu and S. A. Pergantis*, *Metallomics* 2009, 1, 4, 346–352.

21. "Serum total selenium status in Greek adults and its relation to age. The ATTICA study cohort" S. Letsiou, T. Nomikos, D. Panagiotakos, S. A. Pergantis, E. Fragopoulou, S. Antonopoulou*, C. Pitsavos, C. Stefanadis, *Biol. Trace Elem. Res.* 2009, 128, 8–17.
22. "Atomic Spectrometry Update. Elemental Speciation" REVIEW ARTICLE, C. F. Harrington*, R. Clough, H. R. Hansen, S. J. Hill, S. A. Pergantis and J. F. Tyson, *J. Anal. At. Spectrom.*, 2009, 24, 999–1025.
23. "Coumarin-based ratiometric fluorescent indicators with high specificity for lead ions" E. Roussakis, S. A. Pergantis and H. E. Katerinopoulos*, *Chem. Comm.* 2008, 6221–6223.
24. "Nano-electrospray Ion Mobility Spectrometry On-line with Inductively Coupled Plasma – Mass Spectrometry for Sizing Large Proteins, DNA and Nanoparticles" C. Carazzone, R. Raml and S. A. Pergantis*, *Anal. Chem.* 2008, 80 (15), 5812-5818.
25. "Analytical techniques and methods used for antimony speciation analysis in biological matrices" REVIEW ARTICLE, H. R. Hansen* and S. A. Pergantis, *J. Anal. At. Spectrom.* 2008, 23, 1328–1340. (Featured on Journal Front Cover; Designated as Royal Society of Chemistry Hot Article)
26. "Identification of Sb(V)-complexes in biological and food matrices and their stibine formation efficiency during hydride generation with ICP-MS detection" H. R. Hansen* and S. A. Pergantis, *Anal. Chem.* 2007, 79 (14), 5304-5311.
27. "Mapping of arsenic species and identification of a novel arsenosugar in giant clams *Tridacna maxima* and *Tridacna derasa* using advanced mass spectrometric techniques" V. Nischwitz and S. A. Pergantis*, *Environmental Chemistry*, 2007, 4(3), 187-196.
28. "HPLC-ICP-MS and HPLC-ES-MS/MS characterization of synthetic Seleno-Arsenic Compounds" K. Kanaki and S. A. Pergantis*, *Anal. Bioanal. Chem.*, 2007, 387, 8, 2617-2622.
29. "Determination of Selenosugars in Crude Human Urine Using High-Performance Liquid Chromatography Atmospheric Pressure Chemical Ionization Tandem Mass Spectrometry" S. Letsiou, V. Nischwitz, P. Traar, K. A. Francesconi, S. A. Pergantis*, *Rapid Commun. Mass Spectrom.*, 2007, 21, 343-351.
30. "Optimisation of an HPLC Selected Reaction Monitoring Electrospray Tandem Mass Spectrometry Method for the Detection of 50 Arsenic Species" V. Nischwitz* and S. A. Pergantis, *J. Anal. At. Spectrom.*, 2006, 21, 1277-1286.
31. "Investigating the formation of an Sb(V)-citrate complex by HPLC-ICPMS and HPLC-ES-MS(/MS)" H. R. Hansen* and S. A. Pergantis, *J. Anal. At. Spectrom.*, 2006, 21, 1240-1248.
32. "Detection of antimony species in citrus juices and drinking water stored in PET containers" H. R. Hansen and S. A. Pergantis*, *J. Anal. At. Spectrom.*, 2006, 21, 731-733 (Designated as Royal Society of Chemistry Hot Article).
33. "Improved Arsenic Speciation Analysis for Extracts of Commercially Available Edible Marine Algae Using HPLC-ES-MS/MS" V. Nischwitz and S. A. Pergantis*, *J. of Agricultural Food Chemistry* 2006, 54 (18): 6507-6519.
34. "Mass Spectrometric Identification and Characterization of Antimony Complexes with Ribose Containing Biomolecules and an RNA Oligomer" H. R. Hansen and S. A. Pergantis*, *Anal. Bioanal. Chem.* 2006, 385, 821–833.
35. "Mass Spectrometric Identification of Novel Arsinothioyl-sugars in Marine Bivalves and Algae" V. Nischwitz, K. Kanaki and S. A. Pergantis*, *J. Anal. At. Spectrom.* 2006, 21, 33-40.

36. "NMR Investigation of the Interaction of Vanadate with Carbasilatrane in Aqueous Solutions" E. M. Evgeniou, S. A. Pergantis, E. Leontidis, and A. D. Keramidas*, *Inorg. Chem.* 2005, 44, 7511-7522.
37. "First report on the Detection and Quantification of Arsenobetaine in extracts of marine algae using HPLC-ES-MS/MS" V. Nischwitz and S. A. Pergantis*, *Analyst*, 2005, 130, 1348 - 1350.
38. "Liquid chromatography online with selected reaction monitoring electrospray mass spectrometry for the determination of organoarsenic species in crude extracts of marine reference materials" V. Nischwitz and S. A. Pergantis*, *Anal. Chem.*, 2005, 77 (17), 5551-5563.
39. "Arsenic compounds in the haemolymph of the Dungeness crab, Cancer magister, as determined by using HPLC on-line with inductively coupled plasma mass spectrometry" U. Nørum*, V. W.-M. Lai, S. A. Pergantis, W.R. Cullen, *J. Environ. Monit.*, 2005, 7, (2), 122-126.
40. "Application of selected reaction monitoring tandem mass spectrometry to the quantitative determination of an arsenic-containing nucleoside in a crude biological extract" K. A. Francesconi and S. A. Pergantis*, *Analyst*, 2004, 129, 398-399.

For further information contact:

Prof. Spiros A. Pergantis

e-mail: spergantis@uoc.gr

Tel. 2810 545084