# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5–10, 2004

### Plasma Spectrochemistry in the 21st Century

The 2004 Winter Conference on Plasma Spectrochemistry, thirteenth in a series of biennial meetings sponsored by the *ICP Information Newsletter*, features developments in plasma spectrochemical analysis by inductively coupled plasma (ICP), dc plasma (DCP), microwave plasma (MIP), glow discharge (GDL, HCL), and laser sources. The meeting will be held Monday, January 5 through Saturday, January 10, 2004, in Fort Lauderdale, Florida (www.sunny.org) at the Wyndham Bonaventure Resort and Spa (www.wyndham.com/bonaventure). Continuing education short courses at introductory and advanced levels and manufacturers' seminars will be offered Friday through Sunday, January 2-4. Spectroscopic instrumentation and accessories will be shown during a three-day exhibition from January 6 to 8, and a Workshop on New Plasma Instrumentation will be presented on Tuesday, Wednesday, and Thursday afternoons. A golf tournament will be held on Sunday, January 4.

## Objectives and Program

The continued growth in popularity of plasma sources for atomization and excitation in atomic spectroscopy and ionization in mass spectrometry and the need to discuss recent developments of these discharges in spectrochemical analysis stimulated the organization of this meeting. The Conference will bring together international scientists experienced in applications, instrumentation, and theory in an informal setting to examine recent progress in the field. Approximately 600 participants from 30 countries are expected to attend.

Over 300 papers describing applications, fundamentals, and instrumental developments with plasma sources will be presented in lecture and poster sessions by more than 200 authors. Symposia organized and chaired by recognized experts will include the following topics: 1) Sample introduction and transport phenomena; 2) Sampling and preparation for elemental speciation; 3) Elemental speciation; 4) Laser-assisted plasma spectrometry; 5) Plasma instrumentation, including chemometrics, expert systems, on-line analysis, microplasmas, software, and remote-system automation; 6) Sample preparation, treatment and automation, 7) Excitation mechanisms, plasma phenomena and modeling; 8) Spectroscopic standards and reference materials, and high-purity materials; 9) Plasma source mass spectrometry, 10) Glow discharge atomic and mass spectrometry, and 11) Stable isotope analyses. Six plenary and 22 invited lectures will highlight advances in these areas. Four afternoon poster sessions will feature applications, automation, and new instrumentation. Six panel discussions will address critical development areas in sample introduction, instrumentation, elemental speciation, plasma source mass spectrometry, and novel software and hardware. Plenary, invited, and submitted papers will be published in Fall 2004 after peer review as the official Conference proceedings.

## Schedule of Activities

| | |
|---|---|
| Exhibitor Booth Reservation and Pre-Registration Due | Friday, September 12, 2003 |
| Final Abstracts for All Paper Due | Friday, October 3, 2003 |
| Exhibitor Reservation Deadline | Friday, October 3, 2003 |
| Conference Pre-Registration Deadline | Friday, October 10, 2003 |
| Hotel Reservation Deadline | Friday, November 28, 2003 |
| Late Pre-Registration Deadline | Friday, December 5, 2003 |
| 2004 Winter Conference Short Courses | Friday - Sunday, January 2 - 4, 2004 |
| 2004 Manufacturers' Seminars | Friday - Sunday, January 2 - 4, 2004 |
| 2004 Winter Conference on Plasma Spectrochemistry | Monday - Saturday, January 5 - 10, 2004 |
| 2004 Workshop on New Plasma Instrumentation | Tuesday - Thursday, January 6 - 8, 2004 |
| 2004 Instrument Exhibition | Tuesday - Thursday, January 6 - 8, 2004 |
| Conference Manuscripts Submission Deadline | February 18, 2004 |

# 2004 Winter Conference on Plasma Spectrochemistry
# Fort Lauderdale, Florida, January 5 – 10, 2004

## Conference Background

### THE MEETING

The **Winter Conference on Plasma Spectrochemistry** is sponsored biennially by the ICP Information Newsletter, Inc., a nonprofit, philanthropic research organization located in Hadley, Massachusetts, and organized by Dr. Ramon Barnes of the University Research Institute for Analytical Chemistry. Previous meetings were held in San Juan, Puerto Rico (1980); Orlando, Florida (1982); San Diego, California (1984, 1988, 1992, 1994); Kailua-Kona, Hawaii (1986), St. Petersburg, Florida (1990), Fort Lauderdale, Florida (1996, 2000), and Scottsdale, Arizona (1998, 2002). Attendance has grown from 170 in 1980 to more than 600 with world-wide scientific participation representing 30 countries. Technical sessions comprise lectures and posters describing application, fundamental, and instrumentation developments with popular electrical plasma sources. The inductively coupled plasma (ICP), glow discharge sources, microwave induced plasma, direct current plasma, and laser-assisted plasma spectrochemistry are featured. New spectrometric instrumentation, novel sample introduction systems, plasma system automation, sample preparation approaches, elemental speciation, spectroscopic standards, quality assurance, new diagnostic characteristics, and theoretical treatments are highlighted. More than 325 technical papers are presented, and selected papers have been published together as the Conference proceedings in *Spectrochimica Acta, Part B* (1981, 1983, 1985, and 1987), *Journal of Analytical Atomic Spectrometry* (1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002), and *Journal of Analytical Bioanalytical Chemistry* (1998, 2000, 2002). The proceedings of the 2004 Winter Conference will appear in these major spectroscopy journals during Fall 2004.

Some in the field consider the Winter Conference one of the technically most significant meetings convened on these topics. Ten European Winter Conferences have been held as well in Leysin, Switzerland (1985), Lyon, France (1987), Reutte, Austria (1989), Dortmund, Germany (1991), Granada, Spain (1993), Cambridge, England (1995), Gent, Belgium (1997), Pau, France (1999), and Lillehammer, Norway (2001). The 2003 meeting was held in Garmisch-Partenkirchen, Germany, January 13-17, 2003, and the 2005 meeting is planned for Budapest, Hungary, January 29 - February 2.

### THE PEOPLE

The Winter Conference attempts to bring together the major figures in the field of plasma spectrochemistry in a comfortable and informal setting to promote maximum information exchange and conversations. We accomplish this by inviting keynote speakers, employing principals to organize and chair sessions and panel discussions, and by offering technical short-courses taught by experts. Furthermore, experienced and novice analytical chemists seeking to share and expand their experiences in plasma spectrochemistry participate actively. Invited speakers include F. Adams, J.S. Becker, M. Betti, A. Bogaerts, J. Broekaert, R. Cornelis, O. Donard, G. Eiden, A. Garcia Alonso, D. Günther, W. Harrison, K. Heumann, G. Hieftje, J. Hopwood, R.S. Houk, N. Jakubowski, M. Ketterer, G. Knapp, R. Lobinski, J.-M. Mermet, L. Moens, A. Montaser, J. Olesik, R. Russo, A. Sanz-Medel, R. Sturgeon, J. Winefordner, and T. Walczyk. Panel discussions, workshops, and symposia will be lead by J.S. Becker, I. Brenner, J. Caruso, L. Ebdon, P. Farnsworth, C. Grégoire, N. Jakubowski, V. Karanassios, H.M. Kingston, R.K. Marcus, J.-M. Mermet, M. Montes-Bayón, N. Omenetto, B. Sharp, F. Vanhaecke, and P.C. Uden.

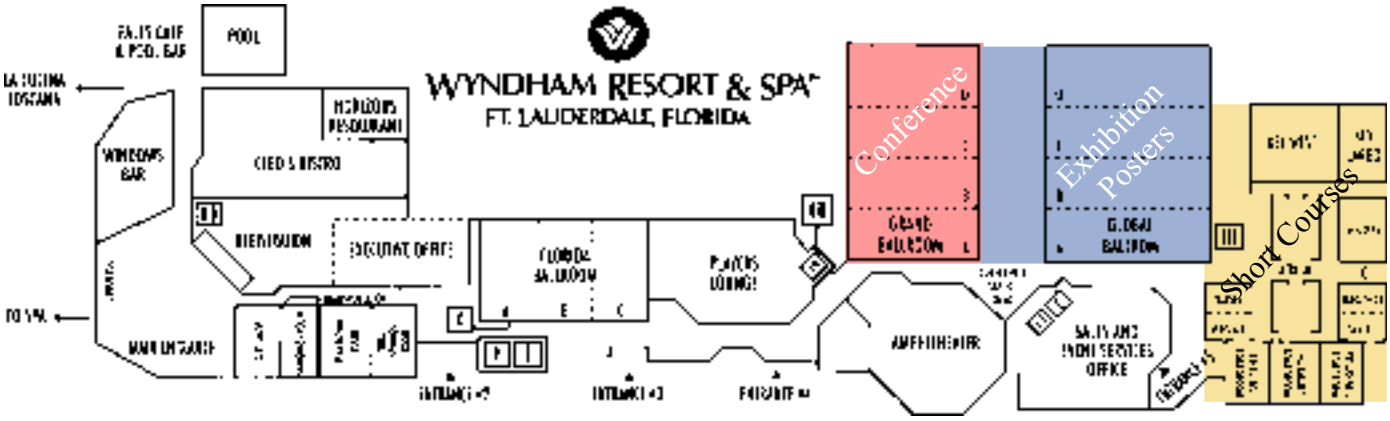
### THE LOCATION

Warm-weather sites are selected for the Winter Conference to promote the relaxed atmosphere conducive to effective scientific information exchanges. Fort Lauderdale (www.sunny.org) is situated in south Florida on the Atlantic Ocean and enjoys a mild climate with an average daily January temperature of 66.2°F. Winter temperatures can reach 75.7°F and seldom fall below 56°F. Greater Fort Lauderdale provides major attractions, museums, cultural and social activities, sports and history, making it a popular convention and vacation location. The 2004 Winter Conference will be held at the Wyndham World Conference Center in the Wyndham Bonaventure Resort & Spa (www.wyndham.com/bonaventure) located in the 1250 acre community of Bonaventure only 20 minutes west of the Fort Lauderdale/Hollywood International Airport (www.fll.net) and 45 minutes from the Miami International Airport (www.miami-airport.com) conveniently served by major interstate highways. Fort Lauderdale is 200 miles north of Key West and 200 miles south of Orlando.

The Wyndham Bonaventure Resort & Spa is a combination hotel with 496 guest rooms, health fitness spa, and

convention facility overlooking two 18-hole championship golf courses and numerous lakes. Guests have access to the nearby Bonaventure Country Club. The 5rd Annual Conference golf tournament will be held on Sunday, January 4.

Ample space for the Conference is available. The 45,000 square-foot World Conference Center includes three ballrooms, an 170-seat amphitheater, 12 meeting rooms, and Conference service and hospitality area. The Grand Ballroom (8160 sq. feet) accommodates 750, and the exhibition area (Global Ballroom) is 120' by 87' (10,440 sq. feet). In total this provides uncrowded space for the meeting and exhibition, posters, receptions, and conversations.




## THE SCHEDULE

The 2004 Winter Conference will include activities beginning on Sunday, January 4, and continuing through Saturday, January 10. The Conference will be preceded on Friday, January 2, through Sunday, January 4, by more than 60 fee-based, professional short-courses, each lasting four hours and presented by experts on specific topics. Simultaneouly, exhibitors and other providers of plasma spectrochemical instruments, supplies, and related products will offer free seminars, training programs, or user's meetings. The Conference begins with a social mixer Sunday evening, January 4, and convenes daily at 8:00 am until 6:30 pm. Lectures, posters, and panel discussions will be presented. A social gathering is planned for each evening beginning at 5 (to 6:30 pm), and a Conference dinner is scheduled for Thursday evening.

## INSTRUMENT EXHIBITION

The three-day exhibition will open on Monday evening, January 5, with a reception in the exhibition area. Spectroscopic instrumentation and chemicals, glassware, publications, and software supporting plasma spectroscopy will be displayed by approximately 40 companies and organizations. Typically, new plasma spectrochemical instrumentation is previewed here.

## MANUFACTURER'S SEMINAR PROGRAM FOR PLASMA INSTRUMENTATION

During the weekend Short Course program, Friday through Sunday, January 2-4, exhibitors and/or producers or distributors of plasma spectrochemical instrument, supplies, and related products will present four-hour seminars, training/education programs, or user's meetings. This program is free, although registration will be required. New or advanced customer training, product introduction and/or demonstrations, product line descriptions, or user's group meetings and discussions are included. These seminars will be presented in parallel with the fee-based short courses.

## WORKSHOP ON NEW PLASMA INSTRUMENTATION

A three-day Workshop on New Plasma Instrumentation will be held Tuesday through Thursday afternoons, January 6 - 8, from 3:15 to 5:15 pm, with 18 vendor presentations on plasma instrumentation, accessories, and sample preparation. Instrument manufacturers will describe new plasma source developments, and exhibitors will discuss sample introduction, alternative sources, and sample preparation. The afternoon program will parallel the exhibition and poster sessions. The Workshop program will be divided into three main sections: plasma source (ICP) atomic emission spectroscopy (Tuesday), plasma source (ICP) mass spectrometry (Wednesday), and plasma accessories (*e.g.*, chromatograph interface, electrothermal vaporizer, laser and spark ablation, special nebulizers, preconcentration and sample introduction equipment, special adapter kits), standards and sample preparation (Thursday). Representatives from companies and/or exhibitors will present brief technical descriptions and discussions of their new products and design philosophy.

# 2004 Winter Conference on Plasma Spectrochemistry Program Outline

## Monday, January 5, 2004

8:00 Opening and Welcome Ramon M. Barnes

8:05 (PL1) *Plenary Lecture* James D. Winefordner, **Comparing Atomic Spectrometric Methods to the "Super Stars"**

### 1. Sample Introduction and Transport Phenomena

Akbar Montaser, Chairman

9:00 (IL1) *Invited Lecture* John Olesik, **Sample Introduction and Sample Plasma Interactions**

9:30 (IL2) *Invited Lecture* Akbar Montaser, **Fundamental Nebulization Processes and Analyte Transport**

### 2. Elemental Speciation: Sampling and Preparation

Les Ebdon, Chairman

1:00 (IL3) *Invited Lecture* Ralph Sturgeon, **SPME for Organometallic Speciation Measurement - Sample Preparation Made Easy?**

1:30 (IL4) *Invited Lecture* Olivier X. Donard, **Sample Preparation for Elemental Speciation**

5:30 (PD1) *Panel Discussion* **Sample Introduction**, Jean-Michel Mermet, Chair

6:30 ***Exhibition Opening and Social Mixer***

## Tuesday, January 6, 2004

### 3. Elemental Speciation

Peter C. Uden, Chairman

8:00 (PL2) *Plenary Lecture* Freddy Adams, **Elemental Speciation: Present Problems and Future Prospects**

9:00 (IL5) *Invited Lecture* Alfredo Sanz-Medel, **Element Speciation in Biological Materials by ICP-MS: A Road to the Proteomics World**

9:30 (IL6) *Invited Lecture* Ryszard Lobinski, **Inductively Coupled Plasma Mass Spectrometry in Proteomics Research**

### 4. Elemental Speciation

Joseph A. Caruso, Chairman

1:00 (IL7) *Invited Lecture* Rita Cornelis, **In Search of Accuracy in Elemental Speciation Analysis**

3 - 6:30 **Poster Session: Sample Introduction, Sampling and Preparation, Elemental Speciation**

3:15 - 5:15 (WS1) *Workshop* New Plasma Instrumentation, Isaac B. Brenner and Robert I. Botto, Chairmen

5:00 ***Social Mixer***

5:30 (PD2) *Panel Discussion* **Problems in Elemental Speciation**, Maria Montes-Bayón, Chair

## Wednesday, January 7, 2004

### 5. Laser Assisted Plasma Spectrochemistry

Gary M. Hieftje, Chairman

8:00 (PL3) *Plenary Lecture* Rick Russo, **Laser Assisted Plasma Spectrochemistry**

9:00 (IL8) *Invited Lecture* Detlef Günther, **The Future of Laser Ablation ICP Mass Spectrometry – ng or nm?**

### 6. Plasmas on a Chip

Vassili Karanassios, Chairman

1:00 (IL9) *Invited Lecture* Jeffery Hopwood, **Inductively Coupled and Capacitively Coupled Microdischarges Operating in the UHF Band**

1:30 (IL10) *Invited Lecture* José Broekaert, **From the ICP to Microplasmas on a Chip**

3 - 6:30 **Poster Session: Automation, Instrumentation, Laser Assisted Plasma Spectrometry, Software**

3:15 - 5:15 (WS2) *Workshop* **New Plasma Instrumentation**, Isaac B. Brenner and Robert I. Botto, Chairmen

5:00 *Social Mixer*

5:30 (PD3) *Panel Discussion* **Microsample Plasma Instrumentation: Frontiers**, Barry Sharp, Chair

## Thursday, January 8, 2004

### 7. Excitation Mechanisms and Plasma Phenomena

Nicolo Omenetto, Chairman

8:00 (PL4) *Plenary Lecture* Gary M. Hieftje, **Prognosis for Plasma-Source Mass Spectrometry**

9:00 (IL11) *Invited Lecture* Annemie Bogaerts, **Laser Ablation: Can Modeling Help Us to "See the Light"?**

9:30 (IL12) *Invited Lecture* Jean-Michel Mermet, **Is the Availability of the Entire UV-Visible Emission Spectrum Beneficial to Our Understanding of the ICP?**

### 8. Sample Preparation, Treatment, and Analysis

Skip Kingston, Chairman

1:00 (IL13) *Invited Lecture* Günter Knapp, **Is an Improvement in the Field of Sample Decomposition Still Imaginable?**

3 - 6:30 **Poster Session: Applications, Glow Discharge Atomic/Mass Spectrometry, Mechanisms, Plasma Sources, Sample Preparation and Standards, Teaching Spectroscopy**

3:15 - 5:15 (WS3) *Workshop* **New Plasma Instrumentation**, Isaac B. Brenner and Robert I. Botto, Chairmen

4:30 (TS1) *Panel Discussion* **An International Approach to Teaching Spectroscopy**, Vassili Karanassios, Chair

6:30 *Conference Dinner*

## Friday, January 9, 2004

### 9. Plasma Source Mass Spectrometry: Fundamentals and Instrumentation

Paul Farnsworth, Chairman

8:00 (PL5) *Plenary Lecture* Norbert Jakubowski, **Plasma Source Mass Spectrometry: Sources and Developments**

9:00 (IL14) *Invited Lecture* R. Sam Houk, **ICP-MS Instrumentation: Status and Future**

9:30 (IL15) *Invited Lecture* Gregory Eiden, **Progress in Collision Cell ICP-MS: Recipe Collections or Science?**

## 10. Plasma Source Spectrometry: Applications and Instrumentation

Ken Marcus, Chairman

1:00 (IL16) *Invited Lecture* Willard Harrison, **Increasing Use of the Glow Discharge for Both Atomic and Molecular Analysis**

1:30 (IL17) *Invited Lecture* Maria Betti, **Applications of GDMS in Different Fields of Research in Comparison to Other Analytical Techniques**

3 - 6:30 **Poster Session: Plasma Mass Spectrometry, Applications, Fundamentals, Instrumentation, Stable Isotopes**

5:00 ***Social Mixer***

5:30 (PD4) *Panel Discussion* **Plasma Source Mass Spectrometry Applications**, Luc Moens, Chair

# *Saturday, January 10, 2004*

## 11. Plasma Source Mass Spectrometry: Applications and Stable Isotope Analysis

Conrad Grégoire, Chairman

8:00 (PL6) *Plenary Lecture* Luc Moens, **Isotope Ratio Measurements with ICP-MS: High End and Low End Instruments and Applications**

9:00 (IL18) *Invited Lecture* Klaus G. Heumann, **Isotope Dilution LA - ICP - MS: A New Calibration Method for Trace Element Determination in Pulverized Solid Samples?**

9:30 (IL19) *Invited Lecture* Jose A. Garcia Alonso, **Multilabelled Speciated Isotope Dilution ICP-MS: The Way to Reliable Quantitative Chemical Speciation**

## 12. Plasma Source High Resolution Mass Spectrometry

J. Sabine Becker, Chairman

1:00 (IL20) *Invited Lecture* Thomas Walczyk, **New Concepts for Using MC-ICP-MS in Biomedical Research**

1:30 (IL21) *Invited Lecture* Michael Ketterer, **Environmental Applications of ICP-MS**

5:00 (IL22) *Invited Lecture* J. Sabine Becker, **Unexplored Directions in HR ICP-MS**

5:30 (PD5) *Panel Discussion* **New Plasma Source Mass Spectrometers**, Norbert Jakubowski, Chair

6:30 *Conference Closing*

# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5 – 10, 2004

## Preliminary Program

### *Monday, January 5, 2004*

### 1. Sample Introduction and Transport Phenomena

Akbar Montaser, Chair

8:00 **PL01 Comparing Atomic Spectrometric Methods to the "Super Stars".** James Winefordner, University of Florida, Department of Chemistry, P.O. Box 117200, Gainesville FL 32611-7200, jdwin@chem.ufl.edu

9:00 **IL01 Sample Introduction and Sample Plasma Interactions.** John Olesik, Ohio State University, Department of Geological Sciences, 125 S. Oval Mall, 275 Mendenhall, Columbus OH 43210, olesik.2@osu.edu

9:30 **IL02 Fundamental Nebulization Processes and Analyte Transport.** Akbar Montaser, The George Washington University, Department of Chemistry, 725 21st St., NW, Washington DC 20052, montaser@gwu.edu

10:00 Break

10:20 **M01 Plasma Spectrochemical Analysis of Petroleum Naphthas Using Low Flow Sample Introduction Equipment.** Robert I. Botto, ExxonMobil Chemical Company, Baytown Chemical Plant Laboratory, 4500 Bayway Drive, Baytown TX 77520, bob.i.botto@exxonmobil.com

10:40 **M02 Taming the Free Up-Take of Pneumatic Nebulizers.** Nimal De Silva, Carleton University, Department of Chemistry, Ottawa ON K1S 5B2, Canada, ndesilva@ccs.carleton.ca

11:00 **M03 Routine CE ICP/MS Speciation Analysis with the Mira Mist CE Interface — Problems and Advantages.** John A. Burgener, Burgener Research Inc., 1680-2 Lakeshore Road W., Mississauga ON L5J 1J5, Canada, burgener@burgenerresearch.com; Yakov Kapusta

11:20 **M04 Transport Efficiencies and Their Impact on Precision and Sensitivity for ETV Sample Introduction into ICPMS.** James A. Holcombe, University of Texas at Austin, Department of Chemistry and Biochemistry, 1 University Station A5300, Austin TX 78712-0165, holcombe@mail.utexas.edu; Gulay Ertas, Niklesch Desai

11:40 **M05 Nano Particle Sample Introduction (PSI) System for Inductively Coupled Plasma - Atomic Emission Spectrometry (ICP-AES).** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranassios@uwaterloo.ca; Lowell Greib

12:00 Lunch Break

### *Monday, January 5, 2004*

### 2. Elemental Speciation: Sampling and Preparation

Les Ebdon, Chair

1:00 **IL03 SPME for Organometallic Speciation Measurement - Sample Preparation Made Easy?** Ralph Sturgeon, Institute for National Measurement Standards, National Research Council of Canada, Montreal Road, Ottawa ON K1A 0R9, Canada, ralph.sturgeon@nrc.ca

1:30 **IL04 Sample Preparation for Elemental Speciation.** Olivier Donard, Université de Pau, CNRS UMR 5034, Hélioparc, 2 Avenue du Président Angot, F-64000 Pau, France, olivier.donard@univ-pau.fr

2:00 **M06 A FI-CE-ICP-MS System with On-Line Preconcentration for Determination of Inorganic Selenium Species.** Carlos E.S. Miranda, Universidade de Sao Paulo, Instituto de Química de Sao Carlos, P.O. 780, 13566-590, Sao Carlos, SP, Brazil; Emanuel Carrilho, Ana Paula G. Gervasio, Ana Claudia S. Bellato, and Maria Fernanda Giné

2:20 **M07 "New" Adventures with "Old" Chelating Agents. Gas Chromatography of Metal Chelates Using Modern Extraction and Detection Methods.** Zoltan Mester, National Research Council of Canada, Institute for National Measurement Standards, 1500 Montreal Road, Ottawa ON K1A 0R6, Canada, zoltan.mester@nrc.ca

2:40 **M08 Use of Accelerated Solvent Extraction for Organotin Speciation in Biological Matrices.** Roberto Morabito, ENEA-PROT, Via Anguillarese, 301, I-0060 Rome, Italy, morabito@casaccia.enea.it; Paolo Massanisso

3:00 Break

3:20 **M09 Application of a Triple Spike Methodology for the Determination of Butyltin Compounds in Biological Materials by Isotope Dilution Mass Spectrometry.** Pablo Rodríguez-González, University of Oviedo, Department of Physical and Analytical Chemistry, Julian Caveria 8, E-33006 Oviedo, Spain, pablorodg@yahoo.com; J. Igancio García Alonso, and Alredo Sanz-Medel

3:40 **M10 Application of Ion Chromatography (IC) with Inductively Coupled Plasma Mass Spectrometric (ICP-MS) Detection for the Characterization of Waste Materials.** Jeffrey Giglio, Argonne National Laboratory - West, P.O. Box 2528, Idaho Falls ID 83404, jeff.giglio@anlw.anl.gov; Cal Morgan, Marianne Noy, and Daniel Cummings

4:00 **M11 Analysis of Uranium/Plutonium Materials with Micro-Column Extraction with Inductively Coupled Plasma Mass Spectrometric (ICP-MS) Detection.** Marianne Noy, Argonne National Laboratory - West, P.O. Box 2528, Idaho Falls ID 83404, jeff.giglio@anlw.anl.gov; Daniel Cummings, and Jeffrey Giglo

4:20 **M12 Mercury Speciation in Aquatic Biota by HPLC/ICP-OES.** Mary Kate Donais, Saint Anselm College, Department of Chemistry, 100 Saint Anselm Drive #1705, Manchester NH 03102-1310, mdonais@anselm.edu; David L. Pfeil

4:40 **M13 Speciation Using Hyphenation of Microseparation Techniques with ICP-MS.** Nancy Miller-Ihli, USDA, Food Composition Laboratory, Rm 1, Bldg. 161 BARC-East, Beltsville MD 20705, miller-ihli@bhnrc.usda.gov; Enrique G. Yanes

5:00 **M14 Ion Pair Chromatography Coupled to ICP-HRMS for the Determination of Phytate and Its Metabolites.** Jörg Bettmer, Johannes Gutenberg-Universität Mainz, Institute of Inorganic Chemistry and Analytical Chemistry, Duesbergweg 10-14, D-55099 Mainz, Germany, bettmer@mail.uni-mainz.de; Andreas Helfrich

Panel Discussion

5:30 **PD01 Sample Introduction.** Jean-Michel Mermet, Unversité Claude Bernard - Lyon I, Laboratoire des Sciences et Stratég, Batiment 308, F69622 Villeurbanne Cedex, France, mermet@cpe.fr

6:30 Exhibition Opening and Social Mixer

## *Tuesday, January 6, 2004*

## 3. Elemental Speciation

Peter C. Uden, Chair

8:00 **PL02 Elemental Speciation: Present Problems and Future Prospects.** Freddy Adams, University of Antwerp, Department of Chemistry, Universiteitsplein 1, B-2610 Wilrijk, Belgium, adams@uia.ua.ac.be

9:00 **IL05 Element Speciation in Biological Materials by ICP-MS: A Road to the Proteomics World.** Alfredo Sanz-Medel, University of Oviedo, Dept Physical, Analytical Chemistry, c/ Julian Claveria, 8, E-33006 Oviedo, Spain, asm@sauron.quimica.uniovi.es

9:30 **IL06 Inductively Coupled Plasma Mass Spectrometry in Proteomics Research.** Ryszard Lobinski, Group of Bio-Inorganic Analytical C, CNRS UMR 5034, Hélioparc, 2 av. du Pr. Angot, F-94053 Pau, France, ryszard.lobinski@univ-pau.fr

10:00 Break

10:20 **T01 Speciation of Arsenic, Selenium and Chromium in Leachates and Pore Waterwaters at Coal-Combustion By-Product Storage Facilities.** Dirk Wallschläger, Trent University, Environmental & Resource Studies Program, 1600 West Bank Dr, Peterborough ON K9J 7B8, Canada, dwallsch@trentu.ca; Claudio N. Ferrarello

10:40 **T02 Are Chicken Farms the Newest Source of Arsenic Contamination?** Hakan Gürleyük, Frontier Geosciences, Inc., 414 Pontius Ave. N., Suite B, Seattle WA 98109-5461, hakang@frontiergeosciences.com; Jeni Garcia, Bob Brunette

11:00 **T03 Determination of Arsenosugars with HPLC-HG-ICPMS.** Ernst Schmeisser, Karl-Franzenzs-University of Graz, Institute of Chemistry - Analytical Chemistry, Universtitätsplatz 1, A-8010 Graz, Austria, ernst.schmeisser@uni-graz.at; Walter Goessler, and Kevin A. Francesconi

11:20 **T04 Characterization of Novel Selenium Volatiles Utilizing GC-ICP-MS/GC-TOF-MS and Quantum Chemistry Modeling Techniques.** Juris Meija, University of Cincinnati, Department of Chemistry, P.O. Box 0172, Cincinnati OH 45221, meijaj@email.uc.edu; Thomas L. Beck, and Joseph A. Caruso

11:40 **T05 Selenium Conjugates with Biological Thiols as Mean of Entering Se Metabolic Pathway in Biological Samples.** Maria Montes Bayón, University of Oviedo, Department of Physical and Analytical Chemistry, c/Julian Claveria 8, E-33006 Oviedo, Spain, montesm@email.uc.edu; Paula Braga Riera, Jesús Alvarez-Piñera, and Alfredo Sanz-Medel

12:00 Lunch Break

## *Tuesday, January 6, 2004*

## 4. Elemental Speciation

Joseph A. Caruso, Chair

1:00 **IL07 In Search of Accuracy in Elemental Speciation Analysis.** Rita Cornelis, University of Gent, Laboratory for Analytical Chemistry, Proeftuinstraat 86, B-9000 Gent, Belgium, rita.cornelis@ugent.be

1:30 **T06 Atomic and Molecular Mass Spectrometry for Characterizing Selenium Containing Proteins in *Brassica Juncea*.** Sandra Mounicou, University of Cincinnati, Department of Chemistry, Box 0172, Cincinnati OH 45223-0172, mounicsn@email.uc.edu; Juris Meija, Baki B.M. Sadi, Patrick A. Limbach, and Joseph A. Caruso

1:50 **T07 Natural Iron Isotopic Variation in Human Blood Proteins.** Christian Wolf, Institute of Food Research, Norwich Research Park, Colney, Norwich NR4 7UA, United Kingdom, christian.wolf@bbsrc.ac.uk; Jurian Hoogewerff, and Mark Roe

2:10 **T08 Analysis of Phosphorus Containing Herbicides by Ion-Pairing Reversed Phase HPLC Coupled to ICP-MS Detection with Collision Cell.** Baki B.M. Sadi, University of Cincinnati, Department of Chemistry, Analytical

Division Mail Location, Cincinnati OH 45221-0172, sadibm@email.uc.edu; Ann P. Vonderheide and Joseph A. Caruso

2:30 **T09 Comprehensive Organic/Inorganic Arsenic Speciation and Detection Using Particle Beam Glow Discharge Mass Spectrometry.** Jake Venzie, Clemson University, Department of Chemistry, 102 BRC Laboratory, Clemson SC 29634-0973, jvenzie@clemson.edu; W. Clay Davis, and R. Kenneth Marcus

2:50 **T10 Gas Chromatography Combined with Fast Flow Glow Discharge Mass Spectrometry.** Karla Newman, University of Wales Swansea, Department of Chemistry, Singleton Park, Swansea SA2 8PP, United Kingdom, karla_newman@isic.org; Rod S. Mason

3:00 – 6:30 Poster Session

Poster Session: Sample Introduction

**TP01 Design and Evaluation of a New Direct Injection Argon/Helium ICP Torch.** Akitoshi Okino, Tokyo Institute of Technology, Department of Energy Sciences, 4259 Nagatsuta, Midori-ku, Yokohama 226-8502, Japan, aokino@es.titech.ac.jp; Hidekazu Miyahara, Hironobu Yabuta, Yoicho Mizusawa, and Takayuki Doi

**TP02 Characterization of W-ETV with Regards to Sample Introduction into Analytical Plasma Sources.** Nicolas Bings, University of Hamburg, Institute for Inorganic and Applied Chemistry, Martin-Luther-King Platz 6, D-20146 Hamburg, Germany, bings@chemie.uni-hamburg.de; Volker Siemens

**TP03 Transport Efficiencies and Their Impact on Precision and Sensitivity for ETV Sample Introduction into ICPMS.** Niklesch Desai, University of Texas at Austin, Department of Chemistry and Biochemistry, 1 University Station A5300, Austin TX 78712-0165, holcombe@mail.utexas.edu; James A. Holcombe

**TP04 Evaluating Robustness of an Ar-$N_2$ Mixed Gas Plasma for ETV-ICPMS.** William Balsanek, University of Texas at Austin, Department of Chemistry and Biochemistry, 1 University Station A5300, Austin TX 78712-0165, holcombe@mail.utexas.edu; James A. Holcombe

**TP05 Determination of Metallic Impurities in $Al_2O_3$ by ETV-ICP-MS Using Thermochemical Modifiers.** José Broekaert, University of Hamburg, Department of Chemistry, Martin-Luther-King-Platz 6, D-20146 Hamburg, Germany, jose.broekaert@chemie.uni-hamburg.de; Birgit Peschel, Nicolas Bings

**TP06 Application of a Novel Sample Introduction System for VPD ICP-MS.** David Bollinger, Air Liquide America LP, Balazs Analytical Service, 13546 N. Central Expressway, MS 3, Dallas TX 75243, david.bollinger@airliquide.com; Scott Anderson

**TP07 Evaluation of Parallel Path Nebulizer for ICP-MS Analysis of Various Matrices Compared with Cross Flow Nebulizer.** Ying Zhou, GE Global Research, One Research Circle, Bldg K-1, Room 2A30, Niskayuna NY 12309, zhouy@crd.ge.com

**TP08 Analysis of Volatile Organic Solvents by Sector Field ICP-MS.** Julian Wills, Thermo Electron, 2 Barkhausenstrasse, D-28197 Bremen, Germany, julianwills@thermo.com

**TP09 Some Biological and Clinical Applications of In-Torch Vaporization Inductively Coupled Plasma Spectrometry (ITV-ICP).** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranassios@uwaterloo.ca; Blair Gibson, and Harrid Badiei

**TP10 Electrostatic Particle Sampler (EPS) for Collection of Airborne Particles and Subsequent Analysis by In-Torch Vaporization Inductively Coupled Plasma (ITV-ICP) Spectrometry.** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranassios@uwaterloo.ca; Greg Sprah

**TP11 Recent Developments in Direct Powder Introduction — Inductively Coupled Plasma (DPI-ICP) Spectrometry.** Nimal De Silva, Carleton University, Department of Chemistry, Ottawa ON K1S 5B2, Canada, ndesilva@ccs.carleton.ca

Poster Session: Sampling and Sample Preparation

**TP12 Sedimentation as a Way of Controlling Particle Size in Slurry Nebulization.** Nimal De Silva, Carleton University, Department of Chemistry, Ottawa ON K1S 5B2, Canada, ndesilva@ccs.carleton.ca; Isa Mohammed, Ibraheem Gaabass

**TP13 Preparation of Stable Slurry for Sample Introduction in Analytical Atomic Spectrometry.** Zheng Wang, Shanghai Institute of Ceramics, Chinese Academy of Sciences, 1295 Dingxi Road, Shanghai 200050, China, wangzheng@sic.ac.cn; Zheming Ni, Deren Qiu, Tianyu Chen, Guagyi Tao, and Pengyuan Yang

**TP14 Elemental Fractionation and Quantification of Natural Water Colloids by FIFFF-HR ICP MS: Development and Validation of a Method.** Björn Stolpe, Göteborg University, Analytical and Marine Chemistry, Kemivägen 10, SE-412 96 Göteborg, Sweden, bjorn@amc.gu.se; Karen Andersson, Tobia Larsson, and David Turner

**TP15 Determination of REE at Ultratrace Levels by On-Line Preconcentration Coupled to Anion Exchange Chromatography - ICP-MS.** Jose Ignacio García Alonso, University of Oviedo, Department of Physical and Analytical Chemistry, Julian Caveria 8, E-33006 Oviedo, Spain, ngalonso@correo.uniovi.es; Ruben Garcia-Fernández, and Alredo Sanz-Medel

**TP16 Preconcentration and Determination of Traces of Antimony in Environmental and Pharmaceutical Samples.** Alexandra Lásztity, Eötvös L. University, Department of Inorganic and Analytical Chemistry, P.O. Box 32, H-1518 Budapest, Hungary, lasztity@para.chem.elte.hu; Katalin Zih-Perenyi, Imre Varga, and Eva Bertalan

**TP17 Total and Speciated Arsenic Measurements in Commercially Available Peanut Butter Spread by ICPMS and IC/HG/ICPMS.** B. Michael Hovanec, West Coast Analytical Service, 9240 Santa Fe Springs Road, Santa Fe Springs CA 90670, mike.hovanec@wcaslab.com

**TP18 Investigation of "Hidden" Arsenicals at Ultra-trace Levels in Biological Samples by LC-Hydride Generation - ICPMS Combined with a High-Efficiency Photoxidation Reactor.** Tetsuya Nakazato, National Institute of Advanced Industrial, Science and Technology (AIST), 16-1 Onogawa, Tsukuba-shi, Ibaraki 305-8569, Japan, tet.nakazato@aist.go.jp; Hiroaki Tao

**TP19 Determination of Arsenic Speciation in Poultry Samples Using IC-ICP-MS.** Tyre D. Grant, U.S. Food and Drug Administration, 6751 Steger Dr., Cincinnati OH 45237, tgrant2@ora.fda.gov; Douglas T. Heitkemper, and Joseph A. Caruso

**TP20 As Speciation by ICP-MS: Effect of the Nebulization System on the Response for the Various As Species.** Fadi Abou-Shakra, GV Instruments, Crews Road, Wythenshawe, Manchester M23 9BE, United Kingdom, fadi.aboushakra@gvinstruments.co.uk; Steve Shuttleworth

**TP21 Evaluation of Genetic Modifications to Improve Phytoremediation of As, Cd, and Se in *Brassica Juncea* Plants by Mass Spectrometric Techniques.** Maria Montes Bayón, University of Oviedo, Department of Physical and Analytical Chemistry, c/Julian Claveria 8, E-33006 Oviedo, Spain, montesm@email.uc.edu; Juris Meija, Joseph A. Caruso, and Alfredo Sanz-Medel

**TP22 Effects of Easily Ionizable Elements (EIES) in the Liquid Sampling Atmospheric Glow Discharge Plasma.** Jake Venzie, Clemson University, Department of Chemistry, 102 BRC Laboratory, Clemson SC 29634-0973, jvenzie@clemson.edu; W. Clay Davis, and R. Kenneth Marcus

**TP23 Characterization of the Liquid Sampling Atmospheric Pressure Glow Discharge Plasma for Microbore HPLC Detection.** Jake Venzie, Clemson University, Department of Chemistry, 102 BRC Laboratory, Clemson SC 29634-0973, jvenzie@clemson.edu; R. Kenneth Marcus

**TP24 Application of Sector-Field ICP-MS for Metallothionein Study of Human Thyroids with Account of Environmental Peculiarities.** Sergei F. Boulyga, Johannes Gutenberg-University Mainz, Institute of Inorganic Chemistry and Analytical, Duesbergweg 10-14, D-55099 Mainz, Germany, boulyga@uni-mainz.de; Valeria Loreti, Jörg Bettmer

**TP25 Comparative Speciation Study of Cancer and Healthy Thyroids.** Sergei F. Boulyga, Johannes Gutenberg-University Mainz, Institute of Inorganic Chemistry and Analytical, Duesbergweg 10-14, D-55099 Mainz, Germany, boulyga@uni-mainz.de; Valeria Loreti, Jörg Bettmer, Klaus G. Heumann

**TP26 HPLC Coupled to Sector-Field ICP-MS and Hybrid Ion Trap Fourier Transform Mass Spectrometry as Complementary Techniques for Pharmaceutical Applications.** Torsten Lindemann, Thermo Electron, Barkhausenstrasse 2, D-28197 Bremen, Germany, meike.hamester@thermo.com

**TP27 Quantification and Characterization of Sulfur in Low Sulfur Reformulated Gasolines by GC/ICP-MS.** Steve Wilbur, Agilent Technologies, 3380 146th Pl SE, Suite 300, Bellevue WA 98007-6472, steve_wilbur@agilent.com

**TP28 Simultaneous Monitoring of Selenium and Sulfur Species from Selenium Enriched Samples by GC-AED and GC-MS.** Harriet Totoe Boakye, University of Massachusetts, Department of Chemistry, 701 Lederle GRC Tower, Amherst MA 01003-9336, pcuden@chem.umass.edu; Eric Block, Julian F. Tyson, and Peter C. Uden

**TP29 Fission Products Determination by CE-EIS-MS and Comparison with IC-ICP-MS.** Maria Betti, Institute for Tansuranium Elements, Joint Research Centre - European Commission, P.O. Box 2340, D-76125 Karlsruhe, Germany, betti@itu.fzk.de; A. Pitois, L. Aldave de las Heras

**TP30 Determination of Halogen Speciation in Waters by Ion Chromatography - Inductively Coupled Plasma - Mass Spectrometry — Is It Possible?** Dirk Wallschläger, Trent University, Environmental & Resource Studies Program, 1600 West Bank Dr, Peterborough ON K9J 7B8, Canada, dwallsch@trentu.ca

**TP31 Direct and Indirect Speciation Analysis of Metal Ions in Waters and Soil Extracts.** Hakan Gürleyük, Frontier Geosciences, Inc., 414 Pontius Ave. N., Suite B, Seattle WA 98109-5461, hakang@frontiergeosciences.com

**TP32 Low Level Cyanide Speciation Analysis by IC-ICP-DRC-MS.** Hakan Gürleyük, Frontier Geosciences, Inc., 414 Pontius Ave. N., Suite B, Seattle WA 98109-5461, hakang@frontiergeosciences.com

**TP33 Determination of Trace Amounts of Phosphorus and Phosphates in Waters.** Hakan Gürleyük, Frontier Geosciences, Inc., 414 Pontius Ave. N., Suite B, Seattle WA 98109-5461, hakang@frontiergeosciences.com

**TP34 Quantification of Methylmercury and Inorganic Mercury in Shark Filets - Results of Different Techniques as well as Influence of Sample Handling on Fresh Fish Material.** Petra Krystek, National Institute of Public Health, and Environment RIVM, P.O. Box 1, NL-3720 BA Bilthoven, The Netherlands, petra.krystek@rivm.nl; Rob Ritsema

**TP35 Characterization of Sealed Radiation Sources by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).** Daniel Cummings, Argonne National Laboratory - West, P.O. Box 2528, Idaho Falls ID 83404, jeff.giglio@anlw.anl.gov; Mary Adamic, Kevin Carney, and Jeffrey Giglio

5:00 – 6:30 Social Mixer

Panel Discussion

5:30 **PD02 Problems in Elemental Speciation.** Maria Montes Bayón, University of Oviedo, Department of Chemistry, C/Julian Claveria 8, E-33006 Oviedo, Spain, mariamb1970@yahoo.com

## *Wednesday, January 7, 2004*

### 5. Laser Assisted Plasma Spectrochemistry

Gary M. Hieftje, Chair

8:00 **PL03 Laser Assisted Plasma Spectrochemistry.** Richard Russo, Lawrence Berkeley National Laboratory, Mail Stop 70-193A, Berkeley CA 94720, rerusso@lbl.gov

9:00 **IL08 The Future of Laser Ablation ICP Mass Spectrometry - ng or nm?** Detlef Günther, Swiss Federal Institute of Technology, Laboratory of Inorganic Chemistry, Hönggerberg HCI G113, CH-8093 Zürich, Switzerland, guenther@inorg.chem.ethz.ch

9:30 **W01 Effect of Size, Chemical and Phase Composition of Ablated Particles on Elemental Fractionation During ICPMS Analysis.** Jan Kosler, Charles University, Department of Geochemistry, Albertov 6, CZ-12843 Prague 2, Czech Republic, kosler@natur.cuni.cz; Michael Wiedenbeck, Richard Wirth, Jan Hovorka, Paul Sylvester, and Jitka Mikova

9:50 Break

10:10 **W02 Birth, Life and Death of Laser-Induced Aerosols: Implications for the Elemental Analysis.** Davide Bleiner, Federal Laboratories for Materials Research, EMPA, Überlandstrasse 129, CH-8600 Dübendorf, Switzerland, davide.bleiner@empa.ch; Peter Lienemann, and Andrea Ulrich

10:30 **W03 Calibration and Particle Effects in Laser Ablation ICP-MS.** R. Sam Houk, Iowa State University, Ames Laboratory USDOE, Department of Chemistry, Ames IA 50011, rshouk@iastate.edu; David B. Aeschliman, Stan Bajic, and David Baldwin

10:50 **W04 Proteome Analysis of Alzheimer's Disease Target Proteins by FT-ICR-MS and Determination of Elements Concentrations by LA-ICP-MS.** J. Susanne Becker, University of Konstanz, Department of Analytical Chemistry, D-78457 Konstanz, Germany, susanne.becker@uni-konstanz.de; Eugen Damoc, Myroslav Zoriy, Carola Pickhardt, Michael Przybylski, and J. Sabine Becker

11:10 **W05 Laser Ablation ICP-MS for the Detection of Phosphorelated Peptides.** Fadi Abou-Shakra, GV Instruments, Crews Road, Wythenshawe, Manchester M23 9BE, United Kingdom, fadi.aboushakra@gvinstruments.co.uk; Victoria Elliott, Cameron McLeod, Peter Marshall, and Kevin Reardon

11:30 **W06 Analysis of Solids Using Laser Ablation ICP-OES with a Large Format Solid State Detector.** Lawrence Neufeld, New Wave Research Inc., 47613 Warm Springs Blvd, Fremont CA 94539, lneufield@new-wave.com; Manny Almeida

11:50 Lunch Break

## *Wednesday, January 7, 2004*

### 6. Plasmas on a Chip, Spectroscopic Instrumentation

Vassali Karanassios, Chair

1:00 **IL09 Inductively Coupled and Capacitively Coupled Microdischarges Operating in the UHF.** Jeffrey Hopwood, Northeastern University, Electrical and Computer Engineering, 360 Huntington Avenue, Boston MA 02115, hopwood@ece.neu.edu

1:30 **IL10 From the ICP to Microplasmas on a Chip.** José A.C. Broekaert, University of Hamburg, Department of Chemistry, Martin-Luther-King-Platz 6, D-20146 Hamburg, Germany, jose.broekaert@chemie.uni-hamburg.de

2:00 **W07 Development and Characterization of a Battery-Operated Plasma Device (MPD).** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranassios@uwaterloo.ca; Zhimin Li

2:20 **W08 Optical Design Considerations for a New Echelle VUV-VIS Spectrometer Designed for ICP-OES.** Peter Brown, Leeman Labs, Inc., 6 Wentworth Dr., Hudson NH 03051, pbrown@leemanlabs.com; Stan B. Smith Jr., Art Reed, and Karl J. Hildebrand

2:40 **W09 ICP Imaging and Analytical Characteristics Using VIS and UV Acousto-Optic Tunable Filters.** Jon Carnahan, Northern Illinois University, Department of Chemistry and Biochemistry, De Kalb IL 60115, carnahan@niu.edu; Ling Bei, Brian J. Englebert

3:00 – 6:30 Poster Session

Poster Session: New Instrumentation

**WP01 The SPECTEC Family of Cleanroom Devices.** Knut D. Ohls, Spectec GmbH, Justus-von-Liebig-Str. 2, D-85435 Erding, Germany, spetec-gmbh@t-online.de; F. Rickert

**WP02 An Echelle Spectrometer for Inductively Coupled Plasma Optical Emission Spectroscopy that has been Modified for the Demanding Analysis of Nitrogen.** Garry Kunselman, Leeman Labs, Inc., 6 Wentworth Drive, Hudson NH 03051, rtamulynas@leemanlabs.com; Arthur Reed, David Pfeil, and Manny Almeida

Poster Session: Laser Assisted Plasma Spectrometry

**WP03 Isotope Dilution Laser Ablation ICP-MS for Direct Trace and Ultratrace Analysis of Environmental Samples.** Sergei F. Boulyga, Johannes Gutenberg-University Mainz, Institute of Inorganic Chemistry and Analytical, Duesbergweg 10-14, D-55099 Mainz, Germany, boulyga@uni-mainz.de; Markus Tibi, and Klaus G. Heumann

**WP04 Use of Laser Ablation for Analysis of Powdered Materials.** Viktor Kanicky, Masaryk University in Brno, Faculty

of Science, Lab Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Markéta Holá, Karel Novotny, Tomás Vaculovic, and Vitezslav Otruba

**WP05 Nanoparticles Differentiation in Laser-Ablation-Induced Aerosols: Implications for the Elemental Analysis of Expitaxial Layers on Si-Wafer.** Davide Bleiner, Federal Laboratories for Materials Research, EMPA, Überlandstrasse 129, CH-8600 Dübendorf, Switzerland, davide.bleiner@empa.ch; Peter Lienemann, Matthias Trottmann, and Andrea Ulrich

**WP06 Characterization of Different New Glass Reference Material Using a Solid State 193 nm Nd:YAG Laser Ablation System.** Marcel Guillong, ETH Swiss Federal Institute of Technology, Laboratory of Inorganic Chemistry, Hönggerberg HCI G107, CH-8093 Zürich, Switzerland, guillong@inorg.chem.ethz.ch; Detlef Günther

**WP07 Effects of Thermal Treatment on Laser Generated Aerosols Using LA-ETV-ICP-MS.** Marcel Guillong, ETH Swiss Federal Institute of Technology, Laboratory of Inorganic Chemistry, Hönggerberg HCI G107, CH-8093 Zürich, Switzerland, guillong@inorg.chem.ethz.ch; Jürg Martin Binkert, and Detlef Günther

**WP08 Applications of a Solid State Multiple Wavelength Laser Ablation System.** Alan Koenig, Cetac Technologies, 14306 Industrial Road, Omaha NE 68144-3334, akoenig@cetac.com; Fred Smith

**WP09 LA-ICP-MS — Studies on the Ionization Efficiency of Laser-Induced Powder Samples.** Ivana Bindzarova, ETH Swiss Federal Institute of Technology, Laboratory of Inorganic Chemistry, Hönggerberg HCI G 107, CH-8093 Zürich, Switzerland, bindzarova@inorg.chem.ethz.ch; Detlef Günther

**WP10 New Approach for Solid Analyses by Laser Plasma.** Alexander A. Sysoev, Moscow Engineering Physics Institute, Department of Molecular Physics, Kashirskoe sh. 31, Moscow 115409, Russia, sysoev@msl.mephi.ru; Alexey A. Sysoev, E.V. Fatushina, G.B. Kuznetsov, S.S. Poteshin, and V.B. Kasyanov

**WP11 Particle-Size Related Elemental Fractionation of Glass: LA or ICP-MS?** Hans-Rudolf Kuhn, ETH Zürich Laboratory of Inorganic Chemistry, ETH Hönggerberg HCI G111, Wolfgang-Pauli-Strasse 10, CH-8093 Zürich, Switzerland, kuhn@inorg.chem.ethz.ch; Detlef Günther

**WP12 Diffusion Studies from a Cs Source into Bulk Rocks Using LA-ICP-MS and Synchrotron-Based Micro XRF.** Detlef Günther, ETH Zürich, Laboratory of Inorganic Chemistry, Hönggerberg HCI G113, CH-8093 Zürich, Switzerland, guenther@inorg.chem.ethz.ch; Beat Aeschlimann, and Daniel Grolimund

**WP13 Depth Profiling of Coated Metals by LA-ICP-MS.** Viktor Kanicky, Masaryk University in Brno, Faculty of Science, Laboratory of Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Ales Hrdlicka, Lubomir Prokes, and Vitezslav Otruba

**WP14 Depth-Profile Studies Using LA-ICP-MS.** Viktor Kanicky, Masaryk University in Brno, Faculty of Science, Laboratory of Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Hans-Ruedi Kuhn, and Detlef Günther

**WP15 Studies of Laser Ablation - ICP Atomic Emission Spectrometry Using Laser Induced Plasma Emission Signals.** Viktor Kanicky, Masaryk University in Brno, Faculty of Science, Laboratory of Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Karel Novotny, Tomas Vaculovic, and Vitezslav Otruba

**WP16 Improved Sample Preparation Methods and Consequent Lead Isotope Analysis in Peat and Plant Material by Multi-Collector (MC-) and Laser Ablation (LA-) Inductively Coupled Plasma Mass Spectrometry (ICP-MS).** Malin Kylander, Imperial College London, Department of Earth Science & Engineering, South Kensington Campus, London SW7 2AZ, United Kingdom, malin.kylander@imperial.ac.uk; B. Coles, T. Jeffries, and D. Weiss

**WP17 LA-ICP-MS of Human Hair.** Eric Salin, McGill University, Department of Chemistry, 801 Sherbrooke St. W., Montreal QC H3A 2K6, Canada, eric.salin@mcgill.ca; Rebecca Lam, and Madeleine Jensen-Fontaine

**WP18 Determination of Trace Metals in Dental Tissues by Laser Ablation - Inductively Coupled Plasma - Mass Spectrometry (LA-ICP-MS): A Quantification Attempt.** Dula Amarasiriwardena, Hampshire College, School of Natural Science, Amherst MA 01002, dula@hampshire.edu; Aaron Buchsbaum, Socheata Tauch, and Anahita Duwa

**WP19 Semi Quantitative Analysis of Trace Metals in Over-the-Counter Calcium Supplements by Laser Ablation - Inductively Coupled Plasma - Mass Spectrometry (LA-ICP-MS).** Dula Amarasiriwardena, Hampshire College, School of Natural Science, Amherst MA 01002, dula@hampshire.edu; Jeremy Draper, and Faith Okpotor

**WP20 LA-ICP-MS for Trace Element Determination and Isotope Ratio Measurements in Thin Sections of Sediments.** Carola Pickhardt, Research Centre Jülich, Central Department for Chemical Analysis, D-52425 Jülich, Germany, c.pickhardt@fz-juelich.de; Oliver Kranendonck, Isaac B. Brenner, and J. Sabine Becker

**WP21 Determination of Uranium, Thorium and $^{235}U/^{238}U$ Isotopic Ratios in Trace and Ultratrace Quantities in Urine by LA-ICP-MS.** M. Burow, Research Centre Jülich, Department for Safety and Radiation Protection, D-52425 Jülich, Germany, m.burow@fz-juelich.de; Carola Pickhardt, Peter Ostapczuk, and J. Sabine Becker

**WP22 LA-ICP-MS: Elemental Fractionation Studies on Matrix-Modified Lithium Tetraborate Pellets.** Peter Weis, Swiss Federal Institute of Technology, Laboratory of Inorganic Chemistry, Hönggerberg HCI G113, CH-8093 Zürich, Switzerland, peter@newfallseason.de; Horst P. Beck, and Detlef Günther

Poster Session: Automation, Software

**WP23 Benefits of Integrating ICP-MS/OES Instruments with LIMS.** Phil Goddard, CSols Inc., 220 Continental Drive, Suite 405, Newark DE 19713, philg@csols.com

**WP24 Getting the Right Result.** Kyle McDuffie, CSols Inc., 220 Continental Drive, Suite 405, Newark DE 19713, kylem@csols.com

**WP25 On Theory of Intellectual Analytical Machines.** Egeniy D. Prudnikov, St. Petersburg State University, Earth's Crust Institute, University emb. 7/9, St. Petersburg 199034, Russia, evgeniy@ep2256.spb.edu; Evgeniy E. Prudnikov

**WP26 Error and Uncertainty in Analysis.** Egeniy D. Prudnikov, St. Petersburg State University, Earth's Crust Institute, University emb. 7/9, St. Petersburg 199034, Russia, evgeniy@ep2256.spb.edu

5:00 – 6:30 Social Mixer

Panel Discussion

5:30 **PD03 Microsample Plasma Instrumentation: Frontiers.** Barry Sharp, Loughborough University, Department of Chemistry, Loughborough L11 3TU, United Kingdom, b.l.shar@lboro.ac.uk

## *Thursday, January 8, 2004*

## 7. Excitation Mechanisms and Plasma Phenomena

Nicolo Omenetto, Chair

8:00 **PL04 Prognosis for Plasma-Source Mass Spectrometry.** Gary Hieftje, Indiana University, Department of Chemistry, 800 E. Kirkwood Avenue, Bloomington IN 47405-7102, hieftje@indiana.edu

9:00 **IL11 Laser Ablation: Can Modeling Help Us to "See the Light"?** Annemie Bogaerts, University of Antwerp (UIA), Department of Chemistry, Universiteitsplein 1, B-2610 Wilrijk - Antwerp, Belgium, annemie.bogaerts@ua.ac.be; Zhaoyang Chen

9:30 **IL12 Is the Availability of the Entire UV-Visible Emission Spectrum Beneficial to Our Understanding of the ICP?** Jean-Michel Mermet, Unversité Claude Bernard - Lyon I, Laboratoire des Sciences et Stratég, Batiment 308, F69622 Villeurbanne Cedex, France, mermet@cpe.fr

10:00 Break

10:20 **Th01 Chemical Imaging Laser Ablation ICP-MS.** Christopher Latkoczy, ETH Zürich Laboratory of Inorganic Chemistry, Hönggerberg HCI G111, Wolfgang-Pauli-Strasse 10, CH-8093 Zürich, Switzerland, latkoczy@inorg.chem.ethz.ch; Detlef Günther

10:40 **Th02 Fundamental Characterization of a Planar-Cathode Glow Discharge: Parametric Observations *via* Laser-Scattering Techniques and Computer Modeling.** Gerardo Gamez, Indiana University, Department of Chemistry, Bloomington IN 47405, ggamez@indiana.edu; Gary M. Hieftje, and Annemie Bogaerts

11:00 **Th03 GDMS: Ionisation of Rydberg Species at the Plasma Boundary.** Rod S. Mason, University of Wales Swansea, Department of Chemistry, Singleton Park, Swansea SA2 8PP, United Kingdom, r.s.mason@swan.ac.uk; Ifor P. Mortimer, Dylan R. Williams, and David J. Mitchell

11:20 **Th04 High-Resolution Images of the Sampling Cone of an Inductively Coupled Plasma Mass Spectrometer.** Paul Farnsworth, Brigham Young University, Department of Chemistry and Biochemistry, C100 Benson Science Building, Provo UT 84602-5700, paul_farnsworth@byu.edu; Andrew Mills, and Jeff Macedone

11:40 **Th05 Investigation and Alleviation of Analyte-Oxide Interferences by Inductively Coupled Plasma Time-of-Flight Mass Spectrometry.** William Wetzel, Indiana University, Department of Chemistry, Bloomington IN 47405, wwetzel@indiana.edu; Denise M. McClenathan, and Gary M. Hieftje

12:00 Lunch Break

## *Thursday, January 8, 2004*

## 8. Sample Preparation, Treatment, and Analysis

Skip Kingston, Chair

1:00 **IL13 Is an Improvement in the Field of Sample Decomposition Still Imaginable?** Günter Knapp, Graz University of Technology, Institute of Analytical Chemistry, Micro- and Radiochemistry, Technikerstrasse 4, A-8010 Graz, Austria, knapp@analytchem.tu-graz.ac.at

1:30 **Th06 Combination of a New High-Throughput Rotor and Diluted Acid for Closed-Vessel Microwave-Assisted Digestion of Biological Materials.** Joaquim Nóbrega, Universidade Federal de Sao Carlos, Depto Quimica, Caixa Postal 676, Sao Carlos, SP 13565-905, Brazil, djan@zaz.com.br; Clésia C. Nascentes, Geórgia C.L. Araújo, Ana Rita A. Nogueira, and Camillo Pirola

1:50 **Th07 Microwave Digestion of High Temperature Refractory Materials with Subsequent HF Elimination by Microwave-Assisted Evaporation with Temperature Cutoff.** Bob Lockerman, CEM Corporation, P.O. Box 200, 3100 Smith Farm Rd., Matthews NC 28106-0200, nicole.collins@cem.com; David Barclay, Elaine Hasty

2:10 **Th08 Novel Methods in High Throughput and High Purity Microwave Assisted Sample Preparation.** Peter Kainrath, S-prep GmbH, Im Amann 7, D-88662 Überlingen 7, Germany, kainrath@s-prep.com; Peter Kettisch, and Michael Zischka

2:30 **Th09 Enabling Speciated Isotope Dilution Mass Spectrometry for Difficult Species Sample Preparation and Analysis.** H.M. "Skip" Kingston, Duquesne University, Department of Chemistry and Biochemistry, Center for Environmental Research, Pittsburgh PA 15282-1530, kingston@duq.edu

3:00 – 6:30 Poster Session

Poster Session: Plasma Spectrochemical Analysis

**ThP01 Spectral Interference Correction in ICP-AES Using Artificial Neural Networks.** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranassios@uwaterloo.ca; Zhimin Li

**ThP02 High-Resolution ICP-OES Analysis of Zirconium Metal.** Geoff Tyler, Jobin Yvon SAS, 16-18, rue du Canal, F-91165 Longjumeau Cedex, France, geoftyler@aol.com; Agnès Cosnier, Nathalie Le Corre, Sébastien Velasquez, Desirée Ahlum, and Albert Brennsteiner

**ThP03 Determination of Trace Elements in Precious Metals by ICP-OES.** Geoff Tyler, Jobin Yvon SA, 16-18, rue du Canal, F-91165 Longjumeau Cedex, France, geoftyler@aol.com; Agnès Cosnier, Nathalie Le Corre, Celia Olivero, Desirée Ahlum, and Albert Brennsteiner

**ThP04 Emission Spectrometric Determination of Boron in Graphite Material with the Axial Plasma Source.** Jarmila Lastincová, Slovak University of Technology, Department of Analytical Chemistry FCHPT-STU, Radlinskeho 9, SK-812 37 Bratislava, Slovakia, lastin@chelin.chtf.stuba.sk; Viera Siranova, and Ernest Beinrohr

**ThP05 Flexible Procedure for Steel Analysis by ICP-OES.** Aida Alvarez Alonso, Research Center in Advanced Materials, Miguel de Cervantes 120, Complejo Industrial Chihuahua, Chihuahua, Mexico, aida.alvarez@cimav.edu.mx; Q. Siliva V. Miranda Navarro, Myriam Moreno López, and J. Eduardo Acevedo del Monte

**ThP06 Survey Study of Metals in Your Indulgent Treats.** Nimi Kocherlakota, Spex CertiPrep, Inc., 203 Norcross Avenue, Metuchen NJ 08840, nkocherlakota@spexcsp.com; Ralph Obernauf

**ThP07 Determination of Iodine in Biological and Food Samples by ICP-OES in VUV.** Viktor Kanicky, Masaryk University in Brno, Faculty of Science, Lab Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Eva Niedobová, Jiri Machát, Vitezslav Otruba

**ThP08 Hydride Generation for the Determination of S, As, Sb and Te in Biological Materials by ICP-OES.** Viktor Kanicky, Masaryk University in Brno, Faculty of Science, Lab Atomic Spectrochemistry, Kotlarska 2, CZ-611 37 Brno, Czech Republic, viktork@chemi.muni.cz; Jitka Studynková, Jiri Machát, and Vitezslav Otruba

**ThP09 Analysis of Agricultural Samples by Simultaneous ICP-OES.** Michelle Cree, Varian, Inc., 13000 Weston Parkway, Cary NC 27513, michelle.cree@varianinc.com; Christine Rivera

**ThP10 Spectrometric Methods Used for Determination of Heavy Metals in Accidental Polluted Soils.** Vasile Viman, North University of Baia Marie, Victor Babes' Street No 62A, 4800 Bai Mare, Romania, v_viman@hotmail.com; Anca Mihaly Cozmuta, Leonard Mihaly Cozmuta, Mariana Dobra, and Gheorghe Vatca

Poster Session: Sample Preparation and Standard/Pure Materials

**ThP11 Trace Element Analysis of Diesel Vehicle Emissions by ICP-MS.** Andrea Ulrich, EMPA Federal Laboratories for, Materials Testing and Research, Überlandstrasse 129, CH-8600 Dübendorf, Switzerland, andrea.ulrich@empa.ch; Adrian Wichser

**ThP12 Application of HR-ICPMS for Multi-Element Determination in Aerosol Particles Collected at "High Traffic Locations" in Europe.** Petra Krystek, National Institute of Public Health and Environment RIVM, Laboratory for Analytical Chemistry, P.O. Box 1, NL-3720 BA Bilthoven, The Netherlands, petra.krystek@rivm.nl; Rob Ritsema

**ThP13 Beryllium Detection in Workplace Swipes by Inductively Coupled Plasma Mass Spectrometry.** Charles Shick, Jr., Savannah River Technology Center, Building 735-A, D-171, Aiken SC 29803, charles.shick@srs.gov; Paula R. Cable-Dunlap, and Stephen P. LaMont

**ThP14 Analysis of Gas Phase Metallic Impurities in Hydrolyzable Gases.** Glenn Mitchell, Air Products and Chemicals, Inc., Analytical Technology, Electronics Gases, GEG, Allentown PA 18195, mitchegm@apci.com; Karen L. Marheftka, and Suhas N. Ketkar

**ThP15 Determination of Phosphorus in Polymeric Systems Using Ashing Procedure and ICP-AES.** Antoaneta P. Krushevska, GE Global Research, One Research Circle, Bldg. K-1Room 2A 28, Niskayuna NY 12309, krushevska@crd.ge.com; June Klimash, Joanne F. Smith, Patrick J. McCloske, and Elizabeth A. Williams

**ThP16 Ultrapure Water Quality and ICP-MS Applications.** Stéphane Mabic, Millipore, Lab Water Division, BP 307, F-78054 Saint-Quentin Yvelines, France, stephane_mabic@millipore.com

**ThP17 Ultrapure Water for Elemental Analysis Down to ppt Level..** Stéphane Mabic, Millipore, Lab Water Division, BP 307, F-78054 Saint-Quentin Yvelines, France, stephane_mabic@millipore.com; Ichiro Kano, and Daniel Darbouret

**ThP18 Lab Accessories Related Contamination: Fact or Fiction?** Adrian Wichser, EMPA Federal Laboratories for, Materials Testing and Research, Überlandstrasse 129, CH-8600 Dübendorf, Switzerland, adrian.wichser@empa.ch; Andrea Ulrich

**ThP19 Accurate Ultra-Trace Metal Analysis in Seawater with Flow Injection HR-ICP-MS.** Jurjen Kramer, Royal Netherlands Institute for Search Research (Royal NIOZ), Department of Marine Chemistry and Geology, P.O. Box 59, NL-1790 AB Den Burg, Texel, The Netherlands, kramer@nioz.nl; Patrick Luan, and Hein J.W. de Baar

Poster Session: Glow Discharge Atomic and Mass Spectrometry

**ThP20 The Addition of $H_2$ to an Ar Plasma Studied by Fast Flow Glow Discharge Mass Spectrometry: Mechanism and Relative Sensitivities.** Karla Newman, University of Wales Swansea, Department of Chemistry, Singleton Park, Swansea SA2 8PP, United Kingdom, karla_newman@isic.org; Rod S. Mason

**ThP21 Investigation of Potential Carrier Effects in the Application of Particle Beam/Hollow Cathode-Optical Emission Spectroscopy (PB/HC-OES) for Total Protein Determinations Based on Atomic Carbon Responses.** Fuxia Jin, Clemson University, Department of Chemistry, 235 H.L. Hunter Laboratory, Clemson SC 29634-0973, fjin@clemson.edu; Keith Lenghaus, James Hickman, and R. Kenneth Marcus

**ThP22 Pulse Glow Discharge Combined with Electron Ionization - TOFMS System as Ion Source for GC** Alexander A. Ganeev, St. Petersburg State University, Chemistry Research Institute, Universitetskij pr. 26, St. Peter, St. Petersburg 198904, Russia, ganeev@lumex.ru; M. Kuzmenkov, M.V. Voronov, and S.V. Potapov

**ThP23 Possibility of an Analytical Signal and a Background Improvements for µs-Pulsed PGD TOF-MS Elemental Analysis by Means of Electron Beam Ionization PGD-EBI and a Sampler Potential Application. Theoretical and Experimental Investigation.** Sergey Potapov, Lumex Ltd., Moskovsky 19, St. Petersburg 198905, Russia, potapov@lumex.ru; Alexander A. Ganeev, Maxim V. Voronov, Evgenij Israilov, and Viktoria Vegizova

**ThP24 Survey on the Suitability of Coatings Containing Hydrogen as Layered CRMs for GD-OES.** Vasile-Dan Hodoroaba, Federal Institute for Materials Research, and Testing (BAM), Unter den Eichen 87, D-12205 Berlin, Germany, dan.hodoroaba@bam.de; Volker Hoffmann, and Wolfgang Paatsch

**ThP25 Novel Use of Sol-Gels as Solid Matrices for Simultaneous Multi-element Determination by Radio Frequency Glow Discharge Optical Emission Spectrometry: Determinations of Suspended Particulate Matter.** Timothy Brewer, Clemson University, Department of Chemistry, 102 BRC Laboratory, Clemson SC 29634-0973, tbrewer@clemson.edu; W. Clay Davis, Julia Cooper, Wandee Luesaiwong, Brian Sprual, and R. Kenneth Marcus

**ThP26 Polypeptide and Nucleobase Spectral Features in Particle Beam Glow Discharge Mass Spectrometry.** Jake Venzie, Clemson University, Department of Chemistry, 102 BRC Laboratory, Clemson SC 29634-0973, jvenzie@clemson.edu; W. Clay Davis, Timothy Brewer, R. Kenneth Marcus

**ThP27 Internal Standard Addition Glow Discharge Mass Spectrometry for the Determination of Radionuclides.** Maria Betti, Institute for Tansuranium Elements, Joint Research Centre - European Commission, P.O. Box 2340, D-76125 Karlsruhe, Germany, betti@itu.fzk.de; M. Kraiem, and L. Aldave de las Heras

**ThP28 Parametric Study of a Radiofrequency Glow Discharge Used for Optical Emission Spectroscopy.** Philippe Belenguer, Centre de Physique des Plasmas CPAT, UMR 5002, 118, route de Narbonne, F-31062 Toulouse Cedex 4, France, belenguer@cpat.ups-tlse.fr; Laurent Therese, and Philippe Guillot

**ThP29 Characterization of Surfaces and Thin Films Down to the Nanometer Scale of Conductive and Non-Conductive Materials by RF-GD-OES.** Patrick Chapon, Jobin Yvon SAS, 16-18 rue du canal, F-91165 Longjumeau cedex, France, chaponp@aol.com; Richard Payling, Celia Olivero, and Philippe Hunault

**ThP30 New Developments in RF Glow Discharge Optical Emission Spectrometry Extends the Range of Applications.** Patrick Chapon, Jobin Yvon SAS, 16-18 rue du canal, F-91165 Longjumeau cedex, France, chaponp@aol.com; Richard Payling, Celia Olivero, Olivier Bonnot, Philippe Hunault

**ThP31 Calculation of the Cathode (Sample) Temperature in Analytical Glow Discharges.** Annemie Bogaerts, University of Antwerp (UIA), Department of Chemistry, Universiteitsplein 1, B-2610 Wilrijk - Antwerp, Belgium, annemie.bogaerts@ua.ua.ac.be; Renaat Gijbels

Poster Session: Plasma Mechanisms

**ThP32 Use of Modulation Techniques in Inductively Coupled Plasma Time-of-Flight Mass Spectrometry.** Denise McClenathan, Indiana University, Department of Chemistry, Bloomington IN 47405, dmcclena@indiana.edu; William C. Wetzel, and Gary M. Hieftje

**ThP33 Using Matrix Effects as a Probe for the Study of the Charge-Transfer Excitation Mechanism in Inductively Coupled Plasma - Atomic Emission Spectrometry.** George C.Y. Chan, Indiana University, Department of Chemistry, Bloomington IN 47405, hieftje@indiana.edu; Gary M. Hieftje

**ThP34 Modeling of Thermochemical Processes in a Method of Atomic Emission Spectrometry with Inductively Coupled Plasma.** Alexander A. Pupyshev, Urals State Technical University, 19 Mira St., Ekaterinburg 620002, Russia, pupyshev@dpt.ustu.ru; Dar'ya A. Danilova

**ThP35 Spectroscopic Measurements of Plasma Properties in an Air-Cooled Argon/Helium ICP.** Hidekazu Miyahara, Tokyo Institute of Technology, Department of Energy Sciences, 4259 Nagatsuta, Modori-ku, Yokohama 226-8502, Japan, miya@hotta.es.titech.ac.jp; Takayuki Doi, Youichi Mizusawa, Yasusi Hayashi, Hironobu Yabuta, Eiki Hotta, and Akitoshi Okino

Poster Session: Plasma Sources

**ThP36 Trace Element Analysis by Sliding Spark Spectrometry.** Alfred Golloch, Universität Duisburg - Essen, Institute für Chemie, FG Instrumentelle Analytik, D-47048 Duisburg, Germany, angyo@lims.uni-duisburg.de; Hudson Angyo, and S. Brockes

**ThP37 Spectral Diagnostics of the Sliding Spark Plasma.** Alfed Golloch, Universität Duisburg - Essen, Institute für Chemie, FG Instrumentelle Analytik, D-47048 Duisburg, Germany, angyo@lims.uni-duisburg.de; Hudson Angyo, and S. Brockes

Poster Session: Teaching Spectroscopy

**ThP38 Research Based Analytical Chemistry Course: Opportunities, Pedagogical Advantages and Rewards.** Dula Amarasiriwardena, Hampshire College, School of Natural Science, Amherst MA 01002, dula@hampshire.edu

Panel Discussion

4:30 **TS01 An International Approach to Teaching Spectroscopy.** Vassili Karanassios, University of Waterloo, Department of Chemistry, Waterloo ON N2L 3G1, Canada, vkaranas@uwaterloo.ca

6:30 Conference Dinner

## *Friday, January 9, 2004*

## 9. Plasma Source Mass Spectrometry: Fundamentals and Instrumentation

Paul Farnsworth, Chair

8:00 **PL05 Plasma Source Mass Spectrometers: Sources and Developments.** Norbert Jakubowski, Institute for Spectrochemistry, and Applied Spectroscopy, P.O. Box 10 13 52, D-44013 Dortmund, Germany, jakubowski@isas-dortmund.de

9:00 **IL14 ICP-MS Instrumentation: Status and Future.** R. Sam Houk, Iowa State University, Department of Chemistry, Ames Laboratory-USDOE, Ames IA 50011-3020, rshouk@iastate.edu

9:30 **IL15 Progress in Collision Cell ICP-MS: Recipe Collections or Science?** Gregory Eiden, Battelle, Pacific NW Laboratory, Richland WA 99352, gregory.eiden@pnl.gov

10:00 Break

10:20 **F01 Ion-Molecule Reactions with Analyte and Overlap Ions for Simple and Complex Sample Analysis by ICP-MS.** John W. Olesik, The Ohio State University, Department of Geological Sciences, 125 S. Oval Mall, Columbus OH 43210, olesik.2@osu.edu; Deanne R. Jones

10:40 **F02 Description of Ion Energy and Collisional Relaxation in Reaction Cell.** Vladimir I. Baranov, MDS SCIEX, 71 Four Valley Drive, Concord, ON L4K 4V8, Canada, vladimir.baranov@sciex.com

11:00 **F03 Can Dynamic Reaction Cell ICP-MS Be Used for Multielement Analysis of Geoenvironmental Samples? Optimization of Operating Conditions and Validation.** Michael Zischka, Technical University Graz, Institute for Analytical Chemistry, Micro and Radiochemistry, Technikerstrasse 4, A-8010 Graz, Austria, zischka@analytchem.tu-gaz.ac.at; Günther Knapp, and Isaac (Joe) B. Brenner

11:20 **F04 The Science of Ion-Molecule Chemistry Recipes in ICP-MS.** Dmitry R. Bandura, PerkinElmer-SCIEX, 71 Four Valley Drive, Concord, ON L4K 4V8, Canada, dmitry.bandura@sciex.com; Vladimir I. Baranov, and Scott D. Tanner

11:40 **F05 Novel Array Detector Coupled to an Inductively Coupled Plasma Mass Spectrograph for the Detection of Transient Chromatographic Signals.** Gregory D. Schilling, Indiana University, Department of Chemistry, 800 E. Kirkwood Avenue, Bloomington IN 47405-7102, gschilli@indiana.edu; James H. Barnes IV, Roger Sperline, M. Bonner Denton, Charles J. Barinage, David W. Koppenaal, and Gary M. Hieftje

12:00 Lunch Break

## *Friday, January 9, 2004*

## 10. Plasma Source Mass Spectrometry: Applications and Instrumentation

Ken Marcus, Chair

1:00 **IL16 Increasing Use of the Glow Discharge for Both Atomic and Molecular Analysis.** Willard W. Harrison, University of Florida, Department of Chemistry, 354 Leigh Hall, Gainesville FL 32611, harrison@chem.ufl.edu

1:30 **IL17 Applications of GDMS in Different Fields of Research in Comparison to Other Analytical Techniques.** Maria Betti, Institute for Tansuranium Elements, European Commission, JRC, P.O. Box 2340, D-76125 Karlsruhe, Germany, betti@itu.fzk.de

2:00 **F06 Investigation of Ultra-Thin Layers by RF-GD-OES.** Volker Hoffmann, Leibniz Institute for Solid State and, Materials Research Dresden, P.O. Box 27 00 16, D-01171 Dresden, Germany, v.hoffmann@ifw-dresden.de

2:20 **F07 The Hydrogen Effect in GD-OES Revisited — Investigations of Polymer Coatings.** Arne Bengtson, Swedish Institute for Metals Research, Drottning Kristinas väg 48, S-114 28 Stockholm, Sweden, gds@simr.se; Thomas Björk

2:40 **F08 A Comparison of Relative Sensitivity Factors for rf and dc Sources for Glow Discharge Mass Spectroscopy.** M. LeRoy Jacobs, Wyoming Analytical Laboratories, Inc., 1511 Washington Avenue, Golden CO 80401, walxray@aol.com; Charles R. Wilson, and Mark R. O'Brien

3:00 – 6:30 Poster Session

Poster Session: Plasma Mass Spectrometry Applications, Fundamentals, Instrumentation, Stable Isotopes

**FP01 Octapole Reaction System ICPMS for the Determination of Selenium in Serum — Theory, Development and Application.** Stefan Stürup, Dartmouth College, Dartmouth Trace Element Core Facility, 6105 Sherman Fairchild Hall, Hanover NH 03755-3571, stefan.sturup@dartmouth.edu

**FP02 Diagnosis and Calibration Techniques for ICP-MS.** Eric Salin, McGill University, Department of Chemistry, 801 Sherbrooke St. W., Montreal QC H3A 2K6, Canada, eric.salin@mcgill.ca; Margaret Antler, and Jane Maxwell

**FP03 Rare Earth Elements and Artificial Neural Networks for Orange Juice Classification.** Seifollah Nikdel, Florida Department of Citrus, CREC, 700 Experiment Station Road, Agriculture Research & Education, Lake Alfred FL 33850-2277, snikdel@citros.state.fl.us; Murak Azik

**FP04 The Analysis of High and Low K Materials by ICP-MS.** Tracey Jacksier, Air Liquide, Chicago Research Center, 5230 S. East Ave., Countryside IL 60525, tracey.jacksier@airliquide.com; Janet Graehling

**FP05 Determination of Si in Aqueous and Organic Samples by DRC-ICP-MS.** Katsuhiko Kawabata, PerkinElmer Instruments, 71 Four Valley Dr., Concord ON L4K 4V8, Canada, katsu.kawabata@sciex.com; Yoko Kishi and Osamu Shikino

**FP06 Reduction of Hf, Zr and Ti Oxide, Hydroxide and Doubly Charge Interface Ions by DRC-ICP-MS.** Yoko Kishi, PerkinElmer Instruments, 71 Four Valley Dr., Concord ON L4K 4V8, Canada, yoko.kishi@sciex.com; Katsu Kawabata, and Osamu Shikino

**FP07 Determination of Phosphorus and Sulfur by DRC-ICP-MS.** Kenneth R. Neubauer, PerkinElmer Life and Analytical Sciences, 710 Bridgeport Avenue, Shelton CT 06484-4794, kenneth.neubauser@perkinelmer.com; Ruth E. Wolf, and Dmitry R. Bandura

**FP08 The Application of Collision/Reaction Cell ICP-MS to the Analysis of Variable and Unknown Samples Without Requiring Matrix-Specific or Element-Specific Tuning and Cell Conditions.** Edward McCurdy, Agilent Technologies UK Ltd, Life Sciences and Chemical Analysis, Lakeside, Cheadle Royal Business, Stockport, Cheshire SK8 2GR, United Kingdom, ed_mccurdy@agilent.com; Steve Wilbur, Don Potter, and Glenn Woods

**FP09 Eclectic Unpublished Results in ICP-MS.** Scott D. Tanner, PerkinElmer Sciex, 71 Four Valley Drive, Concord, ON L4K 4V8, Canada, scott.tanner@sciex.com

**FP10 The Effect of Interface Design on Matrix Effects in ICP-MS: Part 1.** Phil Shaw, Thermo Elemental, Ion Path Road Three, Winsford Cheshire CW7 3BX, United Kingdom, phil.shaw@thermo.com; Jonathan Batey, and Bill Spence

**FP11 Novel ICP-MS Applications for Clinical Sample Analysis.** Bill Spence, Thermo Elemental, Ion Path Road Three, Winsford Cheshire CW7 3BX, United Kingdom, bill.spence@thermo.com; Simon M. Nelms, Martin Nash, and Phil Shaw

**FP12 The Effect of Interface Design on Matrix Effects in ICP-MS: Part 2. Direct Analysis of Seawater by Collision Cell ICP-MS.** Bill Spence, Thermo Elemental, Ion Path Road Three, Winsford Cheshire CW7 3BX, United Kingdom, bill.spence@thermo.com; Simon Nelms, Phil Shaw, and Jonathan Batey

**FP13 A Dual Source Inductively Coupled Plasma/Electrospray Ionization Time-of-Flight Mass Spectrometer for the Simultaneous Acquisition of Atomic and Molecular Mass Spectra.** Steven J. Ray, Indiana University, Department of Chemistry, Bloomington IN 47405, sjray@indiana.edu; Duane Rogers, and Gary M. Hieftje

**FP14 Better ICP-MS Stability for Difficult Samples.** Michael Plantz, Varian, Inc., 201 Hansen Court, Suite 108, Wood Dale IL 60191, mike.plantz@varianinc.com; Steve Anderson, Shane Elliott, and Iouri Kalitchenko

**FP15 A Novel Plasma Interface for ICP-MS.** Iouri Kalinitchenko, Varian Australia Pty Ltd, 679 Springvale Road, Mulgrave, Victoria 3170, Australia, shane.elliot@varianinc.com

**FP16 Variations in Instrumental Mass Discrimination in MC-ICPMS.** Henrik Andrén, Luleå University of Technology, Divisions of Chemistry and Applied Geology, S-971 87 Luleå, Sweden, henrik.andren@km.luth.se; Anna Stenberg, Dmitry Malinovsky, Ilia Rodushkin, and Douglas C. Baxter

**FP17 Determination of Trace Elements in Fish Otoliths and Scales Using Solutions Nebulization and Laser Ablation Double Focusing Sector Field Inductively Coupled Plasma Mass Spectrometry.** Zhongxing Chen, Old Dominion University, Department of Chemistry and Biochemistry, 4541 Hampton Blvd, Norfolk VA 23529-0126, zchen@odu.edu; Cynthia M. Jones

**FP18 Concentrations of 18 Elements in Whole Blood and Serum for Southern Nevada Wild Horses by Sector-Field ICPMS.** James Cizdziel, University of Nevada Las Vegas, Harry Reid Center for Environmental Studies, 4505 Maryland Parkway, Las Vegas NV 89154-4009, cizdziej@unlv.edu; Susan Meacham

**FP19 The Determination of Arsenic and Selenium in Soils and Ashes Using Element 2 ICP-MS.** Mingzhe Zhai, University of Botswana, Department of Geology, Private Bag 0022, Gaborone, Botswana, zhaim@moip.ub.bw

**FP20 Analyzing ppt and ppq Levels of Impurities in High Purity Acids and Water.** Brad McKelvey, Seastar Chemicals, Inc., P.O. Box 2219, 10005 McDonald Park Road, Sidney BC V8L 3S8, Canada, bmckelvey@axys.com; David MacLeod, and Shelley McIvor

**FP21 Recent Developments in Characterizing Semiconductor and Electronic Materials by Direct Solid Sampling ICP-MS.** Fuhe Li, Balazs Analytical Services, Air Liquid America L.P., 46409 Landing Parkway, Fremont CA 94538, fli@balazs.com; Scott Anderson

**FP22 Determination of Spent Uranium Fuel and Calculation of its Burn-up in Nuclear Fallouts After the Accident at Chernobyl NPP.** Sergei F. Boulyga, Johannes Gutenberg-University Mainz, Institute for Inorganic Chemistry and Analytical, Duesbergweg 10-14, D-55099 Mainz, Germany, boulyga@uni-mainz.de; Vladislav P. Mironov, Janna L. Matusevich, Vladimir P. Kudrjashov, Pitor I. Ananich, Vladimir V. Zhuravkov, and J. Sabine Becker

**FP23 Uranium Interference to the Measurement of Plutonium in Environmental and Biological Samples by ICP-MS.** Chunsheng Li, Health Canada, Radiation Protection Bureau, 775 Brookfield Rd, Ottawa ON K1A 1C1, Canada, li_chunsheng@hc-sc.gc.ca; Vladimir Vais, Sonia Johnson, Dorothy Meyerhof, and Jack Cornett

**FP24 Low-Level Chromium Measurements in Clinical Samples by Sector Field ICP-MS.** Joachim Hinrichs, Thermo Electron, 2 Barkhausenstrasse, D-28197 Bremen, Germany, julianwills@thermo.com

**FP25 Retention of Cr(III) by High-Performance Chelation Ion Chromatography Coupled to Inductively Coupled Plasma - Mass Spectrometric Detection with Collision Cell.** Anne Vonderheide, University of Cincinnati,

Department of Chemistry, Mail Location 0172, Cincinnati OH 45223-0172, pawleca@email.uc.edu; Juris Meija, Katherine Tepperman, Allan R. Pinhas, J. Christopher States, and Joseph A. Caruso

**FP26 Determination of Te at Naturally Occurring Levels in Biological Samples by Sector ICPMS with Extraction Resins and Isotope Dilution.** Michael Ketterer, Northern Arizona University, Department of Chemistry, Box 5698, Flagstaff AZ 86011-5698, michael.ketterer@nau.edu; Steven L. Simon

**FP27 MC-ICPMS Studies of Anthropogenic Hf in the Environment.** Michael Ketterer, Northern Arizona University, Department of Chemistry, Box 5698, Flagstaff AZ 86011-5698, michael.ketterer@nau.edu; August Keksis and William C. Wetzel

**FP28 Analysis of Gunshot Residues from Firearms of Different Caliber by Sector Field Inductively Coupled Plasma Mass Spectrometry Technique.** Edson Luis Tocaia dos Reis, Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN-SP - USP Cidade Universitaria, Caixa Postal 11049, 05508-900, Sao Paulo SP, Brazil, eltreis@net.ipen.br; Jorge Eduardo de Souza Sarkis, Cláudio Rodriques, Oswaldo Negrini Neto, and Sonia Viebig

**FP29 ICP-MS Determination of Beryllium at Environmental Levels in Air Filters and Aerogels.** Scott C. Szechenyi, Lawrence Livermore National Laboratory, L-232, PO Box 808, Livermore CA 94551-0808, szechenyi1@llnl.gov; Mark Sutton, Richard K. Bibby, Paul R. Coronadoc, and Bradley K. Esser

**FP30 Determination of Pt, Pd, and Rh in Brazilian Roadside Soils by ICP-MS with NiS Fire Assay Collection.** Jorge Eduardo de Souza Sarkis, Instituto de Pesquisas Energéticas e Nucleares, IPEN-CNEN/SP, Caixa Postal 11049, 05422-970, Sao Paulo SP, Brazil, jesarkis@baitaca.ipen.br; C.P.R. Morcelli, A.M. Figueiredo, M. Kakazu, J. Enzweiler, and J.B. Sigolo

**FP31 Analysis of Irradiated Samples by Atomic Spectrometric Methods.** Pamela Crane, Argonne National Laboratory - West, P.O. Box 2528, Idaho Falls ID 83404, jeff.giglio@anlw.anl.gov; Danile Cummings, and Jeffrey Giglio

**FP32 Measurement of Sulphur and Chloride by Collision Cell, Multi-Collector ICP-MS.** Zenon Palacz, GV Instruments, Crews Road, Wythenshawe, Manchester M23 9BE, United Kingdom, zenon.palacz@gvinstruments.co.uk; Simon Main, Patrick Turner, and Steve Shuttleworth

**FP33 Platform ICP for the Routine Analysis of Water Samples: Meeting the Industry Regulations.** Fadi Abou-Shakra, GV Instruments, Crews Road, Wythenshawe, Manchester M23 9BE, United Kingdom, fadi.aboushakra@gvinstruments.co.uk; Steve Shuttleworth

**FP34 Determination of $^{129}$I in Soil Samples Using On-line Gaseous Introduction in ICP-MS with Collision Cell.** Andrei V. Izmer, Research Centre Jülich, Central Department for Chemical Analysis, D-52425 Jülich, Germany, a.izmer@fz-juelich.de; Miroslav V. Zoriy, and J. Sabine Becker

**FP35 A Study of Polyatomic Interferences in ICP-MS.** Jill W. Ferguson, Ames Laboratory USDOE, B5 Spedding Hall, Iowa State University, Ames IA 50011, jwfergus@iastate.edu; Elizabeth McKinney, Mark Gordon, and R.S. Houk

**FP36 Molecular and Inductively Coupled Plasma Mass Spectrometric Study of Sugar Polyatomic Ions.** Vivien Taylor, Trent University, Watershed Ecosystems, Peterborough ON K9J 7B8, Canada, vitaylor@trentu.ca; Henry Longerich, and Ray March

**FP37 Study on Interference of Polyatomic Ions in Isotope Ratio Measurement of Actinides by ICP-MS.** Masaaki Magara, Japan Atomic Energy Research Institute, Department of Environmental Sciences, Tokai-mura, Naka-gum, Ibaraki 319-1195, Japan, magara@analchem.tokai.jaeri.go.jp; S. Ichimura, M. Takahasi, S. Kurosawa, Y. Saito, F. Esaka, K. Yasuda, S. Sakurai, K. Watanabe, and S. Usuada

**FP38 Use of an Improved Lock Mass Technique for the Routine Analysis of Ultra-Low Concentrations by Sector Field ICP-MS.** Lothar Rottmann, Thermo Electron (Bremen) GmbH, Barkhausenstr. 2, D-28197 Bremen, Germany, lothar.rottmann@thermo.com; Jürgen Lerche

**FP39 Investigation of Inductively Coupled Plasma Mass Spectrometry for the Detection of Radioactive Strontium in Urine Samples.** Anne P. Vonderheide, Research Centre Jülich, Central Department for Chemical Analysis, D-52425 Jülich, Germany, pawleca@email.uc.edu; Myroslav Zoriy, A. Izmer, Carola Pickhardt, Joseph A. Caruso, Peter Ostapczuk, and J. Sabine Becker

**FP40 Accurate Determination of Sulfur and Trace Elements in Gasoline Using Isotope Dilution ICP-MS with Direct Sample Injection.** Sergei F. Boulyga, Johannes Gutenberg-University Mainz, Institute for Inorganic Chemistry and Analytical, Duesbergweg 10-14, D-55099 Mainz, Germany, boulyga@uni-mainz.de; Klaus G. Heumann

**FP41 Determination of $^{90}$Sr and $^{137}$Cs by ICP-MS.** Vivien Taylor, Trent University, Watershed Ecosystems, Peterborough ON K9J 7B8, Canada, vitaylor@trentu.ca; R.D. Evans, and R.J. Cornett

**FP42 Determination of Stable and Radioactive Cs by IC-ICP-MS.** Dominic Larivière, Trent University, Department of Chemistry, 1600 West Bank Drive, Peterborough ON K9J 7B8, Canada, dlarivere@trentu.ca; Vladimir N. Epov, R. Douglas Evans, and R. Jack Cornett

**FP43 Pb-210 by ICP-MS at the Environmental Level: An Analytical Challenge.** Dominic Larivière, Trent University, Department of Chemistry, 1600 West Bank Drive, Peterborough ON K9J 7B8, Canada, dlarivere@trentu.ca; R. Douglas Evans, and R. Jack Cornett

**FP44 $^{239+240}$Pu and Stable Lead Chronologies of Lake Erie Sediments Determined by Sector ICPMS.** Michael Ketterer, Northern Arizona University, Department of Chemistry, Box 5698, Flagstaff AZ 86011-5698, michael.ketterer@nau.edu; Gary D. MacLellan, Gerald Matisoff, and Christopher J. Wilson

**FP45 Inventories and Depth Distributions of $^{239+240}$Pu in Background and Contaminated Soils Determined by Sector ICPMS.** Gary D. MacLellan, Northern Arizona University, Department of Chemistry, Box 5698, Flagstaff AZ 86011-5698, michael.ketterer@nau.edu; Michael Ketterer, Wendy J. Hartsock, and Craig Asplund

**FP46 High Precision U Isotope Ratio Measurement by MC-ICP-MS.** Qianli Xie, Trent University, Water Quality Centre, ERS Program, Peterborough ON K9J 7B8, Canada, qianlixie@trentu.ca; Peter Dillon, and Doug Evans

**FP47 Measurement of Calcium Isotope Ratios Using a Collision Cell Interfaced Multi-Collector ICPMS.** Zenon Palacz, GV Instruments, Crews Road, Wythenshawe, Manchester M23 9BE, United Kingdom, zenon.palacz@gvinstruments.co.uk; Simon Main, and Patrick Turner

**FP48 Overview of the Analytical Processes Used to Simplify Atom Percent Fission Analysis in Uranium and Plutonium Fuels.** Joe Giaquinto, Oak Ridge National Laboratory, 1 Bethel Valley Rd, Bldg 2026, MS 6043, Oak Ridge TN 37831-6043, giaquintojm@ornl.gov; John M. Keller, and Roosevelt Merriweather

**FP49 Comparison of Different Mathematical Methods for the Computation of Isotope Ratios from Transient Signals in ICP-MS.** Diane Beauchemin, Queen's University, Department of Chemistry, Kingston ON K7L 3N6, Canada, beauchmn@chem.queensu.ca

**FP50 Synthesis of $^{77}$Se Enriched Selenomethionine and Its Application to the Determination of Selenomethionine in Selenized Yeast by Isotope Dilution Analysis.** Laura Hinojosa Reyes, University of Oviedo, Department of Physical and Analytical Chemistry, Julian Caveria 8, E-33006 Oviedo, Spain, lauhinojosa76@yahoo.com.mx; J. Igancio García Alonso, and Alredo Sanz-Medel

**FP51 Kinetic and Equilibrium Fe Isotope Fractionation During Redox Cycling of Fe in Seasonally Anoxic Lake Water.** Dmitry Malinovsky, Luleå University of Technology, Division of Applied Geology, SE-97187 Luleå, Sweden, dima@sb.luth.se; Ilia Rodushkin, Jerry Forsberg, Larisa Pekka, Henrik Andren, Anna Stenberg, Douglas C. Baxter, Björn Öhlandeer, Crister Pontèr, and Johan Ingri

**FP52 Environmental Monitoring of Long-Lived Radionuclides at Ultratrace Level in Water Samples from Sea of Galilee by ICP-SFMS and MC-ICP-MS.** Myroslav V. Zoriy, Research Centre Jülich, Central Department for Chemical Analysis, D-52425 Jülich, Germany, m.zoriy@fz-juelich.de; Ludwik Halicz, Carola Pickhardt, Irina Segal, Natalia Teplyakov, Thomas I. Platzner, Peter Ostapczuk, and J. Sabine Becker

**FP53 High Accuracy Multi-Collector Isotope Dilution Mass Spectrometry of PGE's in Catalysts.** Lorna Simpson, LGC Ltd., Queen's Road, Teddington Middlesex TW11 0LY, United Kingdom, lorna.simpson@lgc.co.uk; Ruth Hearn, and Peter Evans

5:00 – 6:30 Social Mixer

Panel Discussion

5:30 **PD04 Plasma Source Mass Spectrometry Applications.** Luc Moens, Ghent University, Laboratory of Analytical Chemistry, Proeftuinstraat 86, B-9000 Ghent, Belgium, luc.moens@rug.ac.be

## *Saturday, January 10, 2004*

### 11. Plasma Source Mass Spectrometry: Applications and Stable Isotope Analysis

Conrad Grégoire, Chair

8:00 **PL06 Isotope Ratio Measurements with ICP-MS: High End and Low End Instruments and Applications.** Luc Moens, University of Gent (RUG), Laboratory of Analytical Chemistry, Proeftuinstraat 86, B-9000 Gent, Belgium, luc.moens@rug.ac.be

9:00 **IL18 Isotope Dilution LA - ICP - MS: A New Calibration Method for Trace Element Determination in Pulverized Solid Samples?** Klaus Heumann, Johannes Gutenberg-Universität Mainz, Institute of Inorganic Chemistry, Duesbergweg 10-14, D-55099 Mainz, Germany, heumann@mail.uni-mainz.de

9:30 **IL19 Multilabelled Speciated Isotope Dilution ICP-MS: The Way to Reliable Quantitative Chemical Speciation.** José Ignacio Garcia Alonso, University of Oviedo, Department of Chemistry, Julian Claveria 8, E-33006 Oviedo, jiga@sauron.quimica.uniovi.es

10:00 Break

10:20 **S01 Mass Discrimination in the Ion Source: Implications for the Accuracy of Isotope Ratio Measurements by MC-ICP-MS.** Douglas C. Baxter, Luleå University of Technology, Divisions of Chemistry and Geology, SE-971 87 Luleå, Sweden, douglas.baxter@km.luth.se; Ilia Rodushkin, Henrik Andrén, Dmitry Malinovsky, and Anna Stenberg

10:40 **S02 Variation in Isotope Ratios During Transient Signals Using Chromatography: Instrumental or Chromatographic Effect?** Douglas Evans, Trent University, Environmental Science Centre, 1600 West Bank Dr., Peterborough ON K9J 7B8, Canada, devans@trentu.ca

11:00 **S03 A Flow Injection System with On-Line Dialysis for Trace Element Determination in Serum Samples by Isotope Dilution Inductively Coupled Plasma Mass Spectrometry.** Maria Fernanda Giné Rosias, Centro de Energia Nuclear na Agricultura, Universidade de Sao Paulo, Av. Centerárlo 303, CEP 13416-970, Piracicaba SP, Brazil, mfgine@cena.usp.br; Ana Cláudia S. Bellato, and Amauri A. Menegário

11:20 **S04 Quantitative Determination of Uranium and Uranium 235/238 Ratios in Human Urine Using Isotopic Dilution - Inductively Coupled Plasma -Mass Spectrometry (ID-ICP-MS).** David Kurk, DoD - US Army CHPPM, MCHB-TS-

LRD, 5158 Blackhawk Road, APG-EA MD 21010-5403, david.kurk@apg.amedd.army.mil; Ronald J. Swatski

11:40 **S05 The Determination of Burn-Up Using a $^{148}$Nd Method. A Comparison Study of Different Mass Spectrometric Techniques.** Zlatin Kopajtic, Paul Scherrer Institut (PSI), Department of Nuclear Energy and Safety, Laboratory of Materials Behavior, CH-5232 Villigen PSI, Switzerland, zlatko.kopajtic@psi.ch; Ines Günther-Leopold, and Beat Wernli

12:00 Lunch Break

## *Saturday, January 10, 2004*

### 12. Plasma Source High Resolution Mass Spectrometry

J. Sabine Becker, Chair

1:00 **IL20 New Concepts for Using MC-ICP-MS in Biomedical Research.** Thomas Walczyk, ETH Zürich Swiss Federal Institute of Technology, Laboratory of Human Nutrition, Seestrasse 72, CH-8803 Rüschlikon, Switzerland, thomas.walczyk@ilw.agrl.ethz.ch

1:30 **IL21 Environmental Applications of ICP-MS.** Michael Ketterer, Northern Arizona University, Department of Chemistry, Box 5698, Flagstaff AZ 86011-5698, michael.ketterer@nau.edu

2:00 **S06 Precise Measurement of Li Isotopes by MCICP-MS and Comparison with TIMS Analyses.** Romain Millot, BRGM French Geological Survey, Service Analyse et Caractérisation Minérale, 3, aveue Claude Guillemin BP 6009, F-45060 Orléans Cedex 2, France, r.millot@brgm.fr; Thomas D. Bullen, and Catherine Guerrot

2:20 **S07 Can Accurate Pb Isotopic Compositions be Determined on Single Fluid Inclusions?** Thomas Pettke, ETH Zürich, Isotope Geochemistry and Mineral Resource IGMR, Sonneggstrasse 5, ETH Zentrum NO, CH-8092 Zürich, Switzerland, pettke@erdw.ethz.ch; Uwe H. Wiechert, Andreas Audetat, Detlef Günther, and Christoph A. Heinrich

2:40 **S08 A Comparison of the Accuracy and Uncertainty Achieved by High Resolution Magnetic Sector ICP-MS, ICP-OES and Collision Cell ICP-MS for the High Accuracy Determination of Ca in Serum.** Lorna A. Simpson, LGC Ltd., Queen's Road, Teddington Middlesex TW11 0LY, United Kingdom, lorna.simpson@lgc.co.uk; Ruth Hearn, and Sheila Merson

3:00 Break

3:20 **S09 ICP-MS Analysis Calcium Isotopes from Human Serum: An Acid Equilibration Method Requiring Low Sample Volume.** Zhensheng Chen, Baylor College of Medicine, USDA/ARS Children's Nutrition Research Center, 1100 Bates Street, Houtson TX 77030, zchen@bcm.tmc.edu; Ian J. Griffin, Yana L. Kriseman, Lily K. Liang, and Steven A. Abrams

3:40 **S10 Natural Iron Isotopic Variation in Individuals with Haemochromatosis Correlates with Genotype.** Jurian Hoogewerff, Institute of Food Research, Norwich Research Park, Colney, Norwich NR4 7UA, United Kingdom, jurian.hoogewerff@bbsrc.ac.uk; Mark Roe, and Christian Wolf

4:00 **S11 Iron Isotopic Fractionation During the Dissolutive Reduction of Synthetic Iron Oxides by Micro-Organisms.** M. Motelica-Heino, BRGM French Geological Survey, Service Analyse et Caractérisation Minérale, 3, avenue Claude Guillemin BP 600, F-45060 Orléans Cedex 2, France, r.millot@brgm.fr; L. Hughet, G. Diot, and F. Garrido

4:20 **S12 Determination of Radionuclides in Drinking Water by Sector Field ICP-MS.** Meike Hamester, Thermo Electron, Barkhausenstr. 2, D-28197 Bremen, Germany, meike.hamester@thermo.de; Michael Paul

4:40 **S13 Development and EURACHEM/CITAC Full Validation of a Sub-ppt ICP-MS Method for Pt Determination in Rat Plasma and Ultrafiltrate by the Hot Plasma Technique.** Claudio Mucchino, Universita di Parma, Dipartimento di Chimica Generale ed Inorganica, Parco Area delle Scienze 17/a, I-43100 Parma, Italy, claudiom@unipr.it; Monica Maffini, Alessandro Mangia, and Patrice Larger

5:00 **IL22 Unexplored Directions in HR ICP-MS.** J. Sabine Becker, Research Centre Jülich, Central Department for Chemical Analysis, D-52425 Jülich, Germany, s.becker@fz-juelich.de

Panel Discussion

5:30 **PD05 New Plasma Source Mass Spectrometers.** Norbert Jakubowski, Institute for Spectrochemistry, and Applied Spectroscopy, P.O. Box 10 13 52, D-44013 Dortmund, Germany, jakubowski@isas-dortmund.de; Ralph Sturgeon, Andreas Prange, and John Olesik

6:30 Conference Closing Ceremony

## *Exhibitors*

Burgener Research, Inc.
CEM Corporation
CETAC Technologies, Inc.
CPI International
Federation of Analytical Chemistry and Spectroscopy Societies
Glass Expansion, Inc.
GV Instruments, Inc.
High Purity Standards
Jobin Yvon Horiba
Leeman Labs, Inc.
Milestone, Inc.
New Wave Research
SCP Science
SGE, Inc.
Society for Applied Spectroscopy
Spectro Analytical Instruments, Inc.
Spectron, Inc.
Spectroscopy Society of Canada
SPEX CertiPrep
Thermo Electron Corporation
Thermo Finnigan
Varian, Inc.

## *Sponsors*

Bristol-Myers Squibb

# Wyndham Bonaventure Global Ballroom

Conference Registration Desk

Pre-Function Area

43 44 42 41

45 46 40 39

47 48 38 37

Poster Area

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 |

Exhibition Area

| | | | | | |
|---|---|---|---|---|---|
| 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 |

| | | | | | |
|---|---|---|---|---|---|
| 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 |

Poster Area

*2004 Winter Conference Exhibition and Posters*
*Tuesday, January 6 - Thursday, January 8*

# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5 – 10, 2004

## HOTEL and TRAVEL RESERVATION FORM

*Wyndham Bonaventure Resort & Spa*
250 Racquet Club Road, Fort Lauderdale, FL 33326

**Indicate**

### *HOTEL ROOM RESERVATION*

ARRIVAL DATE _____ CHECKOUT DATE_____

The *Wyndham Bonaventure Resort & Spa* conference room rate is $109 per night, per room (single or double occupancy) plus 11% tax ($121 total), if reservation form and a deposit for one night of $121 are received in **U.S. FUNDS AND DRAWN ON A U.S. BANK** by November 28, 2003. ***After*** November 28, 2003, a $30 late penalty will apply. The deposit (less late fee) is refundable subject to resale only if written cancellation is received at least 7 days in advance of check-in date. Government rate available.

**Please print clearly and complete one (1) reservation form per room**

ATTENDEE NAME _____
COMPANY NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP/POSTAL CODE _____ COUNTRY _____
WORK PHONE _____ HOME PHONE _____
FACSIMILE _____ E-MAIL _____
SHARING WITH _____
SPECIAL NEEDS (Handicapped/Other)_____ SMOKING _____
NON-SMOKING _____ DOUBLE BED _____ QUEEN BED _____ KING BED _____
**TOTAL DEPOSIT AMOUNT ENCLOSED** _____
CREDIT CARD American Express ___ Diners ___ Discover ___ MasterCard ____ Visa ___
CREDIT CARD NUMBER _____ EXPIRATION DATE _____
SIGNATURE _____
***(Reservation will not be processed without signature)***
NAME OF CARD HOLDER _____
CARD HOLDER'S BILLING ADDRESS _____
CITY _____ STATE _____ ZIP/POSTAL CODE _____
COUNTRY _____ ***Today's Date*** _____

### *AIRLINE RESERVATION*

For information on special domestic and international conference airfares and to make reservations, please contact Ray Beam or complete the following information:

DEPARTURE CITY_____ DEPARTURE DATE _____ TIME _____
RETURN CITY _____ RETURN DATE _____ TIME _____

### *CAR RENTAL and AIRPORT SHUTTLE RESERVATION*

Special car rental conference rates in Florida have been arranged. Airport shuttle service also is available from Fort Lauderdale and Miami International airports.

**CAR** SIZE: Economy _____Compact _____ Mid _____ Full _____
Luxury _____Convertible _____ Mini Van _____ Special Request_____
Pick up Miami_____ Fort Lauderdale _____ Date _____ Time _____
Drop-off Miami _____ Fort Lauderdale _____ Date _____ Time _____
**SHUTTLE**: From Miami ____ Fort Lauderdale ___ Arrival Date _____ Arrival Time_____
Airline _____ Flight Number _____

***Return this form by mail or fax with payment to*** Ray Beam, 2330 W. Belmont Ave., Suite #7, Phoenix, AZ 85021 USA. Telephone 602-242-7025 or 800-336-4009 (US/Canada), Fax 602-242-3735, E-Mail rbeam@qwest.net. ***Make checks payable to ICP Information Newsletter.***

# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5 – 10, 2004

## CONFERENCE FEE SUMMARY

| *Conference Registration Fees* | *Before* October 10, 2003 | *After* | *After* December 5, 2003 |
|---|---|---|---|
| Conference* | $450 | $720 | $900 |
| Exhibitor** | $110 | $335 | $600 |
| Student*** | $ 65 | $110 | $240 |
| Postdoctoral*** | $ 90 | $220 | $400 |
| Single Day*** (2 days max) @ | $170 | $300 | $400 |
| *Short Course Enrollment* (each course) | $100 | $200 | $300 |
| *Conference Dinner* (includes transportation, taxes, gratuity) | | | |
| Conference Dinner (adult) | $ 62 | $ 66 | $ 70 |
| Conference Dinner (child under 12) | $ 31 | $ 32 | $ 33 |
| *Additional or Duplicate, Proceedings* | | | |
| Souvenir T Shirt (Size ___ ) | $ 15 | $ 17 | $ 20 |
| Conference Abstracts (duplicate) | $ 20 | $ 30 | $ 50 |
| Conference Proceedings | $ 55 | $ 60 | $ 65 |

* Conference registration includes Conference abstracts, souvenirs and tee shirt, and one-year subscription to *ICP Information Newsletter*. Conference dinner is not included in the registration fee.

** Conference registration for personnel of organizations participating in Conference exhibition and includes Conference abstracts and souvenir shirt only. Exhibitors must be registered as employees of a sponsoring firm. Conference dinner is not included in the Exhibitor registration fee.

*** Conference registration includes Conference abstracts and souvenir shirt only. Only full-time students are eligible for student registration. Enclose a letter signed by the academic advisor.

No registration fees are charged for accompanying persons, family, or children.

CANCELLATION POLICY: Full refund if written request postmarked before Dec. 5, 2003; 50% refund if request postmarked no later than Dec. 12, 2003. No refund for request postmarked after Dec. 12.

New subscriptions to the *ICP Information Newsletter* for 2004 are available at a special 10% discount [$60.30 (US, Canada), $82.80 (Europe, South America), $91.80 (Asia, Pacific, *etc*.)].

Tax-deducible contributions are solicited to our Conference Travel and Registration Grant funds for students and overseas visitors. Do not overlook your corporate gift matching programs.

Please send payment with Registration form to **WINTER CONFERENCE**, %Ramon Barnes, ICP Information Newsletter, Inc., P.O. Box 666, Hadley, MA 01035-0666.

Federal Employer Identification Number (EIN) is 04-3361420.

---

*American Express, MasterCard or Visa* may be employed to paid for your registration. A 4.7% service charge will be added for each credit-card transaction reflecting bank charges to us. Please enclose the following information with your registration form:

Paid by: ❑ Check or money order ❑ American Express ❑ Master Card ❑ VISA

Cardholder's Name (as printed on card) :_____

Credit Card Account No. (All digits)_____Expiration date_____

Cardholder Signature:_____ Date_____

***2004 Winter Conference on Plasma Spectrochemistry***

**%ICP Information Newsletter, Inc., P.O. Box 666, Hadley, MA 01035-0666;**

**85 N. Whitney St., Amherst, MA 01035-1869**

Dr. Ramon Barnes, Conference Chairman, Telephone (413) 256-8942, Fax (413) 256-3746,

email wc2004@chemistry.umass.edu, http://www-unix.oit.umass.edu/~wc2004/WinterConf2004.htm

# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5 – 10, 2004

## CONFERENCE REGISTRATION

***A. Registration*** **Please Type or Print Clearly**

FAMILY NAME FIRST NAME
COMPANY
ADDRESS

CITY STATE ZIP/POSTAL CODE
COUNTRY E-MAIL
Telephone (Business) (Home) FAX

**Please indicate**:

❑Author ❑Co-author ❑Attending (❑Single day ❑Short Course Only) ❑Exhibitor ❑Student* (❑Predoctoral ❑Postdoctoral)

*Only full-time students are eligible for student registration. Academic advisor must countersign registration.

**Tee Shirt Size**: ❑ Extra Extra Large ❑ Extra Large ❑ Large ❑ Medium ❑ Small ❑ Very Small (Child).

***B. Accompanying Person(s), Transportation, Accommodations*** *(Information purposes only)*

Give names of accompanying person: Spouse or
Children (Names/Ages) Other
Arrival Date/Time Airline
Departure Date Hotel: ❑ Wyndham Bonaventure ❑ Other

| ***C. Conference Registration Fees*** | *Before* **October 10, 2003** | *After* **December 5, 2003** | *After* | *Enter Amount* | *Subtotal* |
|---|---|---|---|---|---|
| ❑ Conference | $450 | $720 | $900 | $_____ | |
| ❑ Exhibitor | $110 | $335 | $600 | $_____ | |
| ❑ Student | $ 65 | $110 | $240 | $_____ | |
| ❑ Postdoctoral | $ 90 | $220 | $400 | $_____ | |
| ❑ Single Day __ days (2 days max)@ | $170 | $300 | $400 | $_____ | $_____ |
| ***D. Short Course Enrollment*** (each) | $100 | $200 | $300 [indicate below] | | |
| **Mark** Date, Time **Fill-in** | **Course Number (SX- 00)** | | **and Name** | | |
| ❑ (1) Jan 2, 8 am **S** - | | | | $_____ | |
| ❑ (2) Jan 2, 1 pm **S** - | | | | $_____ | |
| ❑ (3) Jan 2, 7 pm **S** - | | | | $_____ | |
| ❑ (4) Jan 3, 8 am **S** - | | | | $_____ | |
| ❑ (5) Jan 3, 1 pm **S** - | | | | $_____ | |
| ❑ (6) Jan 3, 7 pm **S** - | | | | $_____ | |
| ❑ (7) Jan 4, 8 am **S** - | | | | $_____ | |
| ❑ (8) Jan 4, 1 pm **S** - | | | | $_____ | |
| ❑ (9) Jan 4, 7 pm **S** - | | | | $_____ | $_____ |

| ***E. Conference Dinner*** (includes transportation, tax, and gratuity) | | | | Number Ordered | | |
|---|---|---|---|---|---|---|
| ❑ Conference Dinner (adult) | $62 | $66 | $70 | (x ) | $_____ | |
| ❑ Conference Dinner (child under 12) | $31 | $32 | $33 | (x ) | $_____ | $_____ |
| ***F. Duplicate/Additional Shirts, Abstracts, Proceedings, Donations*** | | | | Number Ordered | | |
| ❑ Souvenir T Shirt (Size ___ ) | $15 | $17 | $20 | (x ) | $_____ | |
| ❑ Conference Abstracts (duplicate) | $20 | $30 | $50 | (x ) | $_____ | $_____ |
| ❑ Conference Proceedings | $55 | $60 | $65 | (x ) | $_____ | $_____ |
| ❑ Subscription to *ICP Information Newsletter* (January - December 2004) | | | | | $_____ | $_____ |
| ❑ Tax-Deductible Contribution to Conference Travel-Registration Funds | | | | | $_____ | $_____ |
| | | | | **TOTAL** | **$**_____ | |

Please send payment with this Registration form to **WINTER CONFERENCE**, %Dr. Ramon Barnes, ICP Information Newsletter, Inc., P.O. Box 666, Hadley, MA 01035-0666. A 4.7% service charge will be added for credit card payment.

Paid by: ❑ Check or money order ❑ American Express ❑ Master Card ❑ VISA. Cardholder Name: _____

Credit Card Account No._____ Expiration date_____

***Signature:*** ***Date:***

.....

For Conference Use Only REGISTRATION NUMBER 2004__|__|__| - __|__|__|

Payment: $ Check No. Date Received:

Refund: Check Date Acknowledgment:

# 2004 Winter Conference Short Courses

## Friday, January 2 - Sunday, January 4, 2004

## Summary

### *Analysis by Plasma Spectrochemistry*

**SA-01 Trace Analysis of Biomedical Materials**, January 4, 8 am, Ela Bakowska

**SA-02 Analysis of Foods and Food Products**, January 4, 1 pm, Deborah Bradshaw

**SA-03 Solving Multidisciplinary Analytical Problems**, January 2, 7 pm, Antoaneta Krushevska

**SA-04 Analytical and Process Chemistry in Semiconductor Devices Fabrication**, January 2, 8 am

**SA-05 Spectrochemical Analysis of Long-lived Radionuclides**, January 4, 8 am, Sabine Becker, Sergei Boulyga, and Carla Pickhardt

**SA-06 Determination of Inorganic Arsenic, Selenium and Chromium Species in Environmental and Industrial Samples**, January 2, 7 pm, Dirk Wallschläger and Hakan Gürleyük

**SA-07 Geoanalysis Mass Spectrometry**, January 4, 8 am, Isaac B. Brenner, Conrad Grégoire, and Detlef Günther

**SA-08 Petroleum Analysis with Plasma Spectrometry**, January 3, 7 pm, Robert I. Botto and Frank McElroy

**SA-09 Water Quality Applications and Environmental Chemistry**, January 4, 7 pm, Brain Buckley

**SA-10 Spectroscopic Techniques and Applications in a Pharmaceutical Laboratory**, January 3, 1 pm, Nancy Lewen and Martha Schenkenberger

**SA-11 Trace and Ultratrace Analysis of High-Purity Materials**, January 3, 8 am, J. Sabine Becker

**SA-12 Trace Elements in Waters and Wastes by ICP-MS**, January 2, 1 pm, Isaac B. Brenner

**SA-13 Spectrochemical Applications of Reference Materials**, January 2, 8 am, Peter Fodor

**SA-14 Determination of Plutonium by ICP-MS**, January 2, 8 am, Michael E. Ketterer

**SA-15 Understanding and Implementing ICP-AES Methods 200.7 and 6010B**, January 2, 8 am, Deborah K. Bradshaw

### *Instrumentation*

**SI-01 Calibration and Data Evaluation in Atomic Spectrometry**, January 4, 8 am, José Broekaert

**SI-02 Method Validation and Measurement Uncertainty: Advanced Concepts in Analytical Quality Assurance**, January 3, 8 am, Wolfhard Wegscheider

**SI-03 High Resolution ICP-MS**, January 2, 7 pm, Norbert Jakubowski

**SI-04 Glow Discharge Spectrometry**, January 3, 7 pm, Maria Betti, Volker Hoffmann, Norbert Jakubowski, and Ken Marcus

**SI-05 Time-of-Flight Mass Spectrometry for Elemental Analysis**, January 4, 8 am, Gary M. Hieftje

**SI-06 ICP-Mass Spectrometry I: Introduction**, January 3, 8 am, R. Sam Houk

**SI-07 ICP-Mass Spectrometry II: Advanced Topics**, January 3, 1 pm, R. Sam Houk

**SI-08 Laboratory Accreditation for Plasma Spectrochemistry**, January 2, 1 pm, Vahid Majidi

**SI-09 Field Flow Fractionation ICP-MS**, January 4, 8 am, Ronald Beckett

**SI-10 Matrix Effects in ICP-AES and MS**, January 3, 7 pm, Eric Salin and José Todoli

**SI-11 Selecting an ICP-AES System**, January 2, 7 pm, Ken Fredeen

**SI-12 Selecting an ICP-MS System**, January 4, 7 pm, Rob Thomas

**SI-13 Evaluation and Control of ICP-AES and ICP-MS Systems**, January 3, 1 pm, Jean-Michel Mermet and Eric Salin

**SI-14 Theory and Operation of Reaction Cells for ICP-MS**, January 2, 1 pm, Dmitry Bandura, Vladimir Baranov, and Scott Tanner

### *Sample Introduction Techniques*

**SS-01 Micro- and Nano Samples by ICP Spectroscopy**, January 3, 7 pm, Vassili Karanassios

**SS-02 Electrothermal Vaporization for Atomic and Mass Spectrometry**, January 4, 1 pm, D. Conrad Grégoire

**SS-03 Flow Injection Analysis Techniques and Applications**, January 4, 1 pm, Maria Fernanda Giné

**SS-04 Micronebulizer Diagnostics and Analytical and Fundamental Characteristics**, A. Montaser, January 3, 7 pm

**SS-05 Laser Ablation Atomic and Mass Spectrometry I**, January 2, 1 pm, Henry Longerich and Detlef Günther

**SS-06 Laser Ablation Atomic and Mass Spectrometry II Advanced**, January 2, 7 pm, Detlef Günther, Christopher Latkozcy, and Henry Longerich

**SS-07 Nebulizer Characteristics, Design, and Routine Operation for ICP-AES and ICP/MS**, January 3, 1 pm, Richard F. Browner

**SS-08 Plasma Spectroscopic Detection in Chromatography**, January 4, 1 pm, Peter C. Uden

**SS-09 Sample Introduction for ICP-AES and ICP/MS**, January 2, 1 pm, Richard F. Browner

**SS-10 Solid Sample Introduction Techniques and Instrumentation**, January 4, 7 pm, Nimal De Silva

### *Plasma Spectrochemical Techniques*

**ST-01 Advanced Sample Preparation for Plasma Spectrometry**, January 3, 8 am, Mark Tatro

**ST-02 Applications of Isotope Dilutions and Isotopic Measurements**, January 4, 7 pm, Brad Esser

**ST-03 Plasma on a Chip**, January 4, 1 pm, Vassili Karanassios

**ST-04 Element Preconcentration in Trace Analysis**, January 6, 1 pm, Günter Knapp

**ST-05 Glow Discharge Modeling**, January 4, 1 pm, A. Bogaerts

**ST-06 Typical Errors in ICP Analyses and How to Avoid Them**, January 2, 1 pm, Mark Tatro

**ST-07 Microwave Sample Preparation for Inorganic Analysis**, January 3, 1 pm, H.M. “Skip” Kingston

**ST-08 Clean Microwave Digestions for Ultra-trace Analysis**, January 4, 7 pm, H.M. "Skip" Kingston

**ST-09 Plasma Analysis of Food and Drugs - Quality Control and Assessment Procedures**, January 4, 8 am, Fred L. Fricke and Karen A. Wolnik

**ST-10 Plasma Diagnostics: Fundamentals, Measurements, and Applications**, January 3, 1 pm, John W. Olesik

**ST-11 Trace Element Speciation**, January 3, 7 pm, Olivier Donard

**ST-12 Preparing Your Laboratory for ICP-MS**, January 4, 7 pm, Ela Bakowska

**ST-13 Contamination Issues in Trace Elemental Analysis**, January 2, 7 pm, Paul Gaines

**ST-14 Analysis of Biological Samples by High-Resolution ICP-MS**, January 4, 7 pm, Ilia Rodushkin

**ST-15 Who Wants to Be a Millionaire? - Bringing Your New Technology to Market**, January 3, 8 am, Ken J. Fredeen

**ST-16 Stable Isotopes for Metabolic Studies**, January 3, 8 am, Thomas Walczyk

**ST-17 High Performance Sample Digestion Techniques for Trace Element Analysis**, January 5, 7 pm, Günter Knapp

**ST-18 Elemental Speciation for Biological Samples**, January 3, 1 pm, Joseph A. Caruso and Maria Montes-Bayon

**ST-19 U-Th-Pb Dating of Geological Samples by Laser Ablation ICP-MS**, January 3, 8 am, J. Kosler and M. Tubrett

**ST-20 Improving Laboratory Productivity and Data Quality**, January 2, 7 pm, Nimal De Silva

**ST-21 Solid Phase Microextraction as for Trace Element Speciation**, January 2, 1 pm, Zoltan Mester and Ralph Sturgeon

**ST-22 Achieving Reliable Trace Elemental Measurements**, January 2, 8 am, Paul Gaines

**ST-23 Expert Witness Practices for Scientists**, January 2, 8 am, Henry Nowicki

**ST-24 Speciated Isotope Dilution Mass Spectrometry for Speies Sample Preparation and Analysis**, January 4, 1 pm, H.M. Skip Kingston

***Manufacturers' Seminars***

**MS-01 Arsenic, Mercury, and Selenium Speciation with Atomic Fluorescence Spectroscopy, Part I: Theory, Instrumentation and Applications**, January 4, 8 am**; Part 2: Laboratory Experiments and Demonstration**, January 4, 12:30 pm, Yong Cai, Warren Corns and Derek Bryce

***Workshop***

**Workshop on Plasma Instrumentation**, January 6 - 8, 3:15 - 5:15 pm, Isaac (Joe) Brenner and Robert I. Botto

## *Arranged by Date and Time*

**(1) Friday, January 2, 2002, 8 am - 12 noon**

**SA-04 Analytical and Process Chemistry in Semiconductor Devices Fabrication**, To be announced

**SA-13 Spectrochemical Applications of Reference Materials**, Peter Fodor

**SA-14 Determination of Plutonium by ICP-MS**, Michael E. Ketterer

**SA-15 Understanding and Implementing ICP-AES Methods 200.7 and 6010B**, Deborah K. Bradshaw

**ST-22 Achieving Reliable Trace Elemental Measurements**, Paul Gaines

**ST-23 Expert Witness Practices for Scientists**, Henry Nowicki

**(2) Friday, January 2, 2002, 1 pm - 5 pm**

**SA-12 Trace Elements in Waters and Wastes by ICP-MS**, Isaac B. Brenner

**SI-08 Laboratory Accreditation for Plasma Spectrochemistry**, Vahid Majidi

**SI-14 Theory and Operation of Reaction Cells for ICP-MS**, Dmitry Bandura, Vladimir Baranov, and Scott Tanner

**SS-05 Laser Ablation Atomic and Mass Spectrometry I Introduction**, Henry Longerich and Detlef Günther

**SS-09 Sample Introduction for ICP-AES and ICP/MS**, Richard F. Browner

**ST-06 Typical Errors in ICP Analyses and How to Avoid Them**, Mark Tatro

**ST-21 Solid Phase Microextraction as for Trace Element Speciation**, Zoltan Mester and Ralph Sturgeon

**(3) Friday, January 2, 2002, 7 pm - 11 pm**

**SA-03 Solving Multidisciplinary Analytical Problems**, Antoaneta Krushevska

**SA-06 Determination of Inorganic Arsenic, Selenium and Chromium Species in Environmental and Industrial Samples**, Dirk Wallschläger and Hakan Gürleyük

**SI-03 High Resolution ICP-MS**, Norbert Jakubowski

**SI-11 Selecting an ICP-AES System**, Ken Fredeen

**SS-06 Laser Ablation Atomic and Mass Spectrometry II Advanced**, Detlef Günther, Christopher Latkozcy, and Henry Longerich

**ST-13 Contamination Issues in Trace Elemental Analysis**, Paul Gaines

**ST-20 Improving Laboratory Productivity...**, Nimal De Silva

**(4) Saturday, January 3, 2002, 8 am - 12 noon**

**SA-11 Trace and Ultratrace Analysis of High-Purity Materials**, J. Sabine Becker

**SI-02 Method Validation and Measurement Uncertainty: Advanced Concepts....**Wolfhard Wegscheider

**SI-06 ICP-Mass Spectrometry I: Introduction**, Sam Houk

**ST-01 Advanced Sample Preparation for Plasma Spectrometry**, Mark Tatro

**ST-15 Who Wants to Be a Millionaire? - Bringing Your New Technology to Market**, Kenneth J. Fredeen

**ST-16 Stable Isotopes for Metabolic Studies**, Thomas Walczyk

**ST-19 U-Th-Pb Dating of Geological Samples by Laser Ablation ICP-MS**, Jan Kosler and Mike Tubrett

**(5) Saturday, January 3, 2002, 1 - 5 pm**

**SA-10 Spectroscopic Techniques and Applications in a Pharmaceutical Laboratory**, Nancy Lewen and Martha Schenkenberger

**SI-07 ICP-Mass Spectrometry II: Advanced Topics**, R. Sam Houk

**SI-13 Evaluation and Control of ICP-AES and ICP-MS Systems**, Jean-Michel Mermet and Eric Salin

**SS-07 Nebulizer Characteristics, Design, and Routine Operation for ICP-AES and ICP/MS**, Richard F. Browner

**ST-07 Microwave Sample Preparation for Inorganic**

**Analysis**, H.M. "Skip" Kingston

**ST-10 Plasma Diagnostics: Fundamentals, Measurements, Applications**, John W. Olesik

**ST-18 Elemental Speciation for Biological Samples**, Joseph A. Caruso and Maria Montes-Bayon

**(6) Saturday, January 3, 2002, 7 - 11 pm**

**SA-08 Petroleum Analysis with Plasma Spectrometry**, Robert I. Botto and Frank McElroy

**SI-04 Glow Discharge Spectrometry**, Maria Betti, Volker Hoffmann, Norbert Jakubowski, and Ken Marcus

**SI-10 Matrix Effects in ICP-AES and MS: Causes and Cures**, Eric Salin and José Todoli

**SS-01 Micro- and Nano Samples by ICP Spectroscopy**, Vassili Karanasios

**SS-04 Micronebulizer Diagnostics and Analytical and Fundamental Characteristics**, Akbar Montaser

**ST-11 Trace Element Speciation**, O. Donard

**(7) Sunday, January 4, 2002, 8 am - 12**

**SA-01 Trace Analysis of Biomedical Materials**, Ela Bakowska

**SA-05 Spectrochemical Analysis of Long-lived Radionuclides**, Sabine Becker, Sergei Boulyga, and Carla Pickhardt

**SA-07 Geoanalysis Mass Spectrometry**, Isaac B. Brenner, Conrad Grégoire, and Detlef Günther

**SI-01 Calibration and Data Evaluation in Atomic Spectrometry**, José Broekaert

**SI-05 Time-of-Flight Mass Spectrometry for Elemental Analysis**, Gary M. Hieftje

**SI-09 Field Flow Fractionation ICP-MS**, Ronald Beckett

**ST-09 Plasma Analysis of Food and Drugs - Quality Control and Assessment Procedures**, Fred L. Fricke and Karen A. Wolnik

**(8) Sunday, January 4, 2002, 1 pm - 5 pm**

**SA-02 Analysis of Foods and Food Products**, Deborah Bradshaw

**SS-02 Electrothermal Vaporization for Atomic and Mass Spectrometry**, D. Conrad Grégoire

**SS-03 Flow Injection Analysis Techniques and Applications**, Fernanda Giné

**SS-07 Plasma Spectroscopic Detection in Chromatography**, Peter C. Uden

**ST-03 Plasma on a Chip**, Vassili Karanassios

**ST-05 Glow Discharge Modeling**, Annemie Bogaerts

**ST-24 Speciated Isotope Dilution Mass Spectrometry for Species Sample Preparation and Analysis**, H.M. Skip Kingston

**(9) Sunday, January 4, 2002, 7 - 11 pm**

**SA-09 Water Quality Applications and Environmental Chemistry**, Brian Buckley

**SI-12 Selecting an ICP-MS System**, Robert Thomas

**SS-10 Solid Sample Introduction Techniques and Instrumentation**, Nimal De Silva

**ST-02 Applications of Isotope Dilutions and Isotopic Measurements**, Brad Esser

**ST-08 Clean Microwave Digestions for Ultra-trace Analysis**, H.M. "Skip" Kingston

**ST-12 Preparing Your Laboratory for ICP-MS**, Ela Bakowska

**ST-14 Analysis of Biological Samples by High-Resolution ICP-MS**, Ilia Rodushkin

**(10) Monday, January 5, 2002, 7 - 11 pm**

**ST-17 ST-17 High Performance Sample Digestion Techniques for Trace Element Analysis**, Günter Knapp

**(11) Tuesday, January 6, 2002, 7 - 11 pm**

**ST-04 Element Preconcentration in Trace Analysis**, Günter Knapp

# 2004 Winter Conference Short Courses

## Friday, January 2 - Sunday, January 4, 2004

# Descriptive Abstracts

### Analysis by Plasma Spectrochemistry

**SA-01 Trace Analysis of Biomedical Materials**, January 4, 8 am, Ela Bakowska, National Medical Services, 3701 Welsh Road, Willow Grove, PA 19090 [ela.bakowska@nmslab.com]

Topics to be covered in this course include (1) physical facilities and laboratory layout for trace and ultratrace analyses; (2) sample collection and handling, suitable specimens, appropriate containers to obtain the correct answer; (3) trace elements, implications in disease states, current accepted knowledge for both essential and toxic elements; (4) techniques, discussion of inductively coupled plasma emission and mass spectrometry, graphite furnace atomic absorption spectrophotometry, evaluation of an appropriate technique for each element; (5) techniques, multiple element screening *vs*. single element analysis, and (6) speciation, total metal *vs*. species specific analysis, future role.

**Keywords**: Trace elements, biomedical analysis, toxicology, graphite furnace atomic absorption analysis, inductively coupled plasma emission and mass analysis

**SA-02 Analysis of Foods and Food Products**, January 4, 1 pm, Deborah K. Bradshaw, Atomic Spectroscopy Training and Consulting, P.O. Box 536307, Orlando, FL 32853-6307 [70454.151@compuserve]

The presence of inorganic constituents in food systems has typically been limited to the essential mineral nutrients. Advanced developments in medical and food science reveal a growing relationship between the non-nutrient trace metals and certain physical and metabolic changes in the food. Currently, most food processors and manufacturers use fairly simple preparation techniques for complex samples (*e.g.*, carbohydrates, proteins, fats), and the incomplete decomposition of the samples leads to questionable analytical results. This course will start with a brief overview of the importance of the analysis of trace metals in foods. Sample preparation techniques including wet and dry ashing and

microwave digestion will be discussed. Atomic spectroscopic techniques (flame atomic absorption, graphite furnace atomic absorption, ICP-AES and ICP-MS) will be compared for the analysis of foods. Specific examples with analytical results of the sample preparation and analysis techniques will be presented. The course will conclude with a presentation of validation of data with good quality control.

**Keywords**: Cooking, nutrients, micro-minerals, metabolism, data validation, ICP-AES, ICP-MS, microwave digestions, atomic absorption

**SA-03 Solving Multidisciplinary Analytical Problems,** January 2, 7 pm, Antoaneta Krushevska, General Electric, Global Research Center, One Research Circle, K1 2A 28, Schenectady, NY 12309 [krushevska@crd.ge.com]

Many industrial and research labs face the challenge of analyzing a variety of sample types, analytes and their concentrations. Guidelines in lab organization and how to proceed will be given when inorganic (metals, alloys, products, catalysts, advanced materials, semiconductor wafers), organic (reagents, monomers and polymers, biological and clinical materials) and other sample types need to be analyzed. Sample preparation methods such as wet digestion (conductive and microwave heating), dry ashing, and fusion will be compared and guidelines given for their application. Problems encountered with ICP-AES and ICP-MS measuring techniques will be discussed and possible solutions outlined.

**Keywords**: Inorganic and organic samples, advanced materials, sample preparation, ICP-AES and ICP-MS

**Antoaneta (Toni) Krushevska**. Born in Bulgaria and a graduate of Sofia University, Bulgaria, with a PhD in Analytical and Inorganic Chemistry, Toni started her career as analytical chemist in the field of non-ferrous metallurgy and then moved to ferrous metallurgy, mining, ore dressing and environmental control. Tired of "dirty" materials she changed to the analysis of high purity semiconductor and specialty chemicals using emission spectrography, AAS and ICP-AES. In 1991 Toni arrived in the United States and worked for many years with Ramon Barnes at the University of Massachusetts, Amherst, developing new methods for biological and clinical samples, comparing different system for sample digestion including various microwave systems, and solving problems of interferences in ICP-AES and ICP-MS measurements. To explore new possibilities she relocated to California and worked in the Silicon Valley on semiconductor products analysis. Returning to the East Coast she is confronted now with the everyday analytical challenges of sample varieties at the General Electric Research Center, which tests all her accumulated analytical experience. These experiences will be systematically presented in this short course. She has published many articles in international journals.

**SA-04 Analytical and Process Chemistry in Semiconductor Devices Fabrication**, January 4, 2 am

Chemical purity is a major variable in the fabrication of functional semiconductor devices. This course is designed to provide an overview of the chemicals used in semiconductor device fabrication and the associated analysis of these chemicals focusing on the role of ICP-MS. Topics will include the (1) wet chemical processes involved in device fabrication; (2) methods and standards for measuring industry grade chemicals; (3) effects of elemental impurities on device performance; (4) contamination sources and solutions; (5) Vapor Phase Decomposition (VPD) technique; (6) procedure for collecting and maintaining reliable samples and standards.

**Keywords**: ICP-MS, semiconductor device fabrication, quantitative analysis, elemental impurity analysis, analytical techniques, trace elements, semiconductor grade chemicals

**SA-05 Spectrochemical Analysis of Long-lived Radionuclides**, January 4, 8 am, Sabine Becker, Sergei Boulyga, and Carla Pickhardt, Central Department for Analytical Chemistry, Research Center Jülich GmbH, D-52425 Jülich, Germany [s.becker@fz-juelich.de, s.boulyga@fz-juelich.de]

For a couple of years ICP-MS with its ability to provide a very sensitive multielemental determination of trace and ultratrace elements and precise isotopic analysis has been increasingly established for the determination of long-lived radionuclides especially in environmental materials such as waters, geological, biological and medical samples, in nuclear materials, and in radioactive waste [J.S. Becker, H.-J. Dietze, *Encyclopedia Analytical Chemistry*, John Wiley, 1999, 12947]. The aim of this course is to discuss the state of the art and the progress in determination of long-lived radionuclides by ICP-MS and LA-ICP-MS in routine analysis and research compared with TIMS, GDMS, and radioanalytical techniques.

**Keywords:** Environmental samples, ICP-MS, isotope ratio measurements, LA-ICP-MS, long-lived radionuclides, multicollector ICP-MS, radioactive waste, separation techniques, trace and ultratrace analysis, urine

**SA-06 Determination of Inorganic Arsenic, Selenium and Chromium Species in Environmental and Industrial Samples**, January 2, 7 pm, Dirk Wallschläger, Environmental & Resource Studies Program, Trent University, 1600 West Bank Dr, Peterborough, ON K9J 7B8, Canada [dwallsch@trentu.ca], and Hakan Gürleyük, Frontier Geosciences, Inc., Seattle, WA 98109 [hakang@frontiergeosciences.com]

This course illustrates various approaches for the determination of inorganic arsenic, selenium and chromium species in environmental and industrial water and soil/sediment samples. Measurements of individual isotopes by various types of ICP-MS instrumentation are discussed, including elimination of common spectral interferences. The performance of ICP-MS is compared to other common detection approaches. Strategies for maintaining speciation during sampling and storage are explained and evaluated. Different liquid chromatographic separation methods are discussed, and

compared to commonly used, operationally defined speciation approaches. Finally, we present a number of representative environmental and industrial case studies to illustrate method performance, typical results and common problems.

**Keywords:** Arsenic, selenium, chromium, ICP-MS, LC, speciation, mining/smelting, power plants, petroleum refining, biocides

**Dirk Wallschläger** joined the Environmental & Resource Studies Program at Trent University (Peterborough, ON, Canada) as an Assistant Professor of Environmental Chemistry in July 2002. He obtained his PhD in Environmental Analytical Chemistry from the Universität Bremen (Germany) in 1996, and his MSc in Analytical Chemistry from the Ruhr-Universität Bochum (Germany) in 1992. From 1997 to 2002, he was a Research Scientist with Frontier Geosciences, Inc. (Seattle, WA), where he established and led the Metal(loid) Speciation & Geochemistry Group. His current research interests focus on the analytical determination of anionic inorganic trace element species by hyphenated speciation methods, particularly LC-ICP-MS. His main areas of application include the interaction between the biogeochemical cycles of (trace) elements, the geochemistry of arsenic and selenium in reducing environments, and using speciation information for the design of specific industrial waste treatment procedures.

**Hakan Gürleyük** has developed various methods for speciation analysis using ion chromatography coupled to an ICP-MS detector since his arrival at Frontier in July 2000. These methods provide extremely low detection limits and are used routinely for chromium, arsenic, selenium, and cyanide speciation. Dr. Gürleyük is working on the development of a portable spectrometer for the determination of arsenic in waters. This project is sponsored by the SBIR program of the USEPA and proposes to build an arsenic detector that can produce laboratory quality data in the field for a fraction of the cost of sending samples back to the lab. He is also interested in developing on-line monitoring systems for various contaminants. He has been working on improving the determination of trace elements in difficult matrices by ICP-MS. He has developed a method that uses an ICP-MS instrument equipped with a dynamic reaction cell to provide detection limits orders of magnitude lower than those achieved by most analytical laboratories. Dr. Gürleyük received his PhD in Analytical Chemistry from the University of Massachusetts, Amherst, MA in 2001, a MS from Sam Houston State University, Huntsville, TX in 1996, and a BS Chemistry from Bogazici University in Istanbul, Turkey in 1994.

**SA-07 Geoanalysis Mass Spectrometry**, January 4, 8 am, Isaac B. Brenner, 9 Dishon St., Apt. 9, Malkha, Jerusalem 96956, Israel [brenner@cc.huji.ac.il]; Conrad Grégoire, Geological Survey of Canada, 601 Booth St., Room 721, Ottawa, ON K1A 0E8, Canada [gregoire@nrcan.gc.ca], and Detlef Günther, Laboratory of Inorganic Chemistry, ETH Zürich, Universitätstrasse 6, CH-8092 Zürich, Switzerland [guenther@inorg.chem.ethz.ch]

This course will describe the application of ICP-MS in geoanalysis. Topics covered will include sample preparation, calibration procedures using internal standards, and isotope dilution analysis. Direct solids techniques using lasers, slurries, and ETV will be described. New sample introduction devices such as membrane desolvators for solvent extraction will be presented. The performance of enhanced devices such as the S-option will be described. Problem solving with the participants will be given substantial attention.

**Keywords:** Geoanalysis, ICP-MS, sample preparation, calibration, isotope dilution, direct solids analysis, applications

**SA-08 Analysis of Petroleum and Petrochemical Products by Plasma Spectrochemistry**, January 3, 7 pm, Robert I. Botto, ExxonMobil Chemical Co., 4500 Bayway Dr., Baytown, TX 77520 [bob.i.botto@exxonmobil.com], and Frank C. McElroy, Exxon Research, [fcmcelr@erenj.com]

This course will share practical knowledge from a combined 50+ years of instructor experience on the analysis of petroleum and petrochemical products using plasma spectrochemistry. The topics will include sample preparation, specialized equipment for direct analysis of organic solutions, sample introduction techniques and analysis techniques using ICP atomic emission and mass spectrometry. Special consideration will be given to volatile organic matrices and element species, precision and accuracy and trace element speciation. Materials to be discussed include crude oils, naphthas, lube oils, waxes, solvents, gasoline, fuel oils, catalysts, polymers and other sample types related to the petrochemical industry. There will be ample time to discuss student problems and interests.

**Keywords:** ICP, petroleum, ICP-AES, ICP-MS, plasma spectrochemistry, petrochemicals, sample preparation, speciation, solvents, hydrocarbons

**Bob (Robert I.) Botto** was born in Buffalo, NY. His dad (Melvin R.) was a chemist and Bob developed an interest in chemistry in the fourth grade. With the help of a chemistry set and encouraged by his parents and teachers, Bob learned much about the world of chemistry before entering college at the State University of New York at Buffalo where he became a chemistry major. During college he continued to experiment in his own laboratory at home and at one point invented a solution that all made chemical light by just adding water. This was demonstrated once to a young lady and that started a form of chemistry quite difficult to predict or control. Bob and Kathy were married six years later in 1975 as Bob completed his doctorate in geochemistry at Cornell University. Bob and Kathy moved to Baytown, Texas the same year as Bob began working for Exxon Research and Engineering Company (ER&E). Bob's first assignment at ER&E was to commission the new inductively coupled plasma atomic emission spectrometer. Thus he was able to pioneer many plasma spectrochemical techniques for petroleum and pet-

rochemicals. Bob joined the ExxonMobil Baytown Chemical Plant in 1995 where he works today. His laboratory specializes in analytical problem solving for ExxonMobil refineries and chemical plants. Bob has published 30+ papers in the area of analytical atomic spectroscopy. Bob continues to be active as a promoter of chemistry for kids and has led the American Chemical Society Greater Houston Section's Community in Chemistry Committee since the mid 90's. Each year he presents his traveling "Magic in Chemistry" show to thousands of kids. Bob is an ultramarathon runner and a veteran of 30 races longer than 25 miles including three 100-mile finishes. Bob is the team captain of the ExxonMobil Corporate Track & Field Team and current vice president of the US Corporate Athletics Association.

**Frank C. McElroy** received a PhD in Analytical Chemistry from Syracuse University in 1977 and has been a research associate at ExxonMobil Research & Engineering for 25 years. He worked in developing environmental sampling and analysis methods for numerous programs throughout Exxon's refinery and chemical plants aimed at characterizing air, water and solids as part of EPA and company emission assessments. He was

group program leader with technical responsibilities for the atomic spectroscopy (ICP-AES, ICP/MS, AAS, X-ray fluorescence), precious metal assay, and chromatography laboratories at EMRE's Corporate Research Analytical Sciences Lab. His tasks included method development, and conducting developmental research programs in the atomic spectroscopy and chromatography fields. Published numerous papers and written methods in these areas. He is now responsible for the Analytical Sciences Section at the ExxonMobil Research Center in Annandale NJ. This section has approximately 30 employees with half being PhD professionals covering a broad range of analytical disciplines to support research and affiliate problem solving characterization needs.

**SA-09 Water Quality Analysis Methods and Environmental Chemistry**, January 4, 7 pm, Brian T. Buckley, Environmental and Occupational Health Sciences Institute, Rutgers University, 170 Frelinghuysen Rd., Piscataway NJ 08854 [bbuckley@eohsi.rutgers.edu]

Trace elemental analysis in water and supporting media by current instrumental atomic spectrometric methods will be the primary focus of this course. The advantages and disadvantages of analysis by commercial plasma techniques including ICP-MS will be emphasized. Topics covered include standard and/or practical methods for sample collection, storage, transport and tracking of various environmental media such as air particulate, soils, sediment, biologicals and especially water. Sample preparation, quality assurance, sample-tracking techniques will be described. Field studies, practical analysis hints, isotope dilution, stable isotope labeling and isotope ratio measurements for source apportionment will also be presented.

**Keywords**: Trace elemental analysis, environmental media, water quality analysis, sample handling

**Brian Buckley** is Executive Director at the Environmental and Occupational Health Sciences Institute (EOHSI) and a member of the graduate faculty at Rutgers University. His research involves trace metal quantification and speciation by chromatography coupled ICP-MS as well as microwave assisted solvent extraction.

**SA-10 Spectroscopic Techniques and Applications in a Pharmaceutical Laboratory**, January 3, 1 pm, Nancy S. Lewen and Martha Schenkenberger, Bristol-Meyers Squibb, Pharmaceutical Research Institute, 1 Squibb Dr., New Brunswick, NJ 08093 [nancy.lewen@.bms.com, m.schenkenberger@bms.com]

The ethical pharmaceutical industry strives to ensure the purity and efficacy of their products. Also bound by regulations, the industry fully characterizes drug substances. While much emphasis is on the organic moieties, trace metal concentrations in drugs are increasingly important. Catalyst and metallic residues from processing equipment, drug purity, and clean validations are all of concern. In this course, we shall share some of our experiences in the application of spectroscopic techniques in pharmaceutical analysis. Techniques discussed are ICP-OES, ICP-MS, flame AAS, graphite furnace AAS, laser ablation, hyphenated techniques, such as IC- and LC-ICP-MS. The use of organic solvent, rather than digestion techniques, for many pharmaceutical applications will be discussed.

**Keywords**: Pharmaceutical compounds, trace metals analysis, drug compounds, trace analysis

**Nancy Lewen** is a Senior Research Scientist with the Bristol-Myers Squibb Pharmaceutical Research Institute. She has been supervisor of the atomic spectroscopy laboratory for 14 years. The laboratory provides support for all phases of the drug development process, including method development, technology transfer and process troubleshooting. The laboratory is equipped with flame and graphite furnace AAS's, as well as ICP-AES, ICP-MS and LA-ICP-MS equipment.

**Martha Schenkenberger** joined Bristol-Myers Squibb in 1991. She is employed as a Research Scientist in the Atomic Spectroscopy laboratory in the Analytical Research and Development department. The primary function of the laboratory is to provide trace metals analysis during all of the stages of drug development. Flame atomic absorption spectroscopy (FAAS), graphite furnace atomic absorption spectroscopy (GFAAS), inductively coupled plasma-atomic emission spectroscopy (ICP-AES), inductively coupled plasma-mass spectrometry (ICP-MS) and laser ablation-ICP-MS are the techniques used to provide this analytical support. Martha is currently exploring the technique of LA-ICP-MS to determine how it can better be used to solve analytical problems. She is also investigating the use of the Aridus membrane desolvation system. Martha has published articles and taught this course at the Winter Conference on Plasma Spectrochemistry with Nancy Lewen.

**SA-11 Trace and Ultratrace Analysis of High-Purity Materials and in Materials Science by Plasma Mass Spectrometry**, January 3, 8 am, J. Sabine Becker, Central Department for Analytical Chemistry, Research Center Jülich GmbH, D-52425 Jülich, Germany [s.becker@fz-

juelich.de]

ICP-MS and LA-ICP-MS with their ability to provide very sensitive multielemental analysis have been established in routine analysis and material research, for example, for the determination of trace and ultratrace elements in high-purity materials (metals, semiconductors and insulators), in solutions (high-purity water, solvents) and in different technical samples. The determination of elements in the ultratrace concentration range is often difficult owing to possible matrix effects, blank values of chemical used, possible memory effects, and disturbing interferences by polyatomic ions. This course will describe the application of ICP-MS and LA-ICP-MS in material science, especially for the analysis of high-purity materials. New trends in instrumental equipment, analytical procedures, calibration strategies, and the capability of ICP-MS and LA-ICP-MS (detection limits, accuracy and precision) for the determination of trace and ultratrace elements in high-purity materials and in material sciences (ceramics, thick and thin layers, nanoclusters, *etc*.) will be discussed.

**Keywords**: Ceramics, chemicals, direct solids analysis, high-purity materials, ICP-MS, LA-ICP-MS, microelectronics, semiconductors, trace and ultratrace analysis

**SA-12 Trace Elements in Waters and Wastes by ICP-AES and -MS**, January 2, 1 pm, Isaac B. Brenner, 9 Dishon St., Apt. 9, Malkha, Jerusalem 96956, Israel [brenner@cc.huji.ac.il]

The course will describe ICP-MS applications, approaches, and methodology for determination of dissolved and acid extractable elements in pristine and waste water and solid wastes; applications of ICP-MS in waste disposal; routine monitoring of trace element concentrations; establishing trace metal water quality data base; contribution of natural background and other natural sources; anthropogenic contamination; fingerprinting aquifers, surface and waste waters and sediments with diagnostic trace elements; establishing diagnostic trace element and trace element rations to fingerprint origin, migration, and pollution sources; characterizing brines and industrial contamination; speciation in waters and sediments, and characterizing water entities using isotope ratios. The application of ICP-AES and MS will be described for analysis of water, wastewater and related solid waste using EPA 200.7, EPA 200.8, and SW 846 procedures. The course will commence with an overview of requirements for correct and reliable sampling and sample delivery including, sampling plans, site documents, statistical models, health hazards, and chain of custody procedures. Examples will be described for reliable statistical sampling of heterogeneous and stratified waste using sampling devices. Typical statistical calculations will be exemplified. Requirements for sample preservation including container types, reagents for preservation, and holding times will be reviewed.

**Keywords**: Compliant analysis, ICP-AES, ICP-MS, trace metals analysis, water, wastes, solids, EPA methods

**SA-13 Spectrochemical Applications of Reference Materials**, January 2, 8 am, Peter Fodor, Szent István University, Department of Applied Chemistry, PO Box 53, H-1518 Budapest, Hungary [fodorp@omega.kee.hu]

This course will include basic concepts and practical use of reference materials. The main topics are definitions, target use, quality control, accreditation, quality control systems, selection criteria, and producers of reference materials. Practical aspects discussed include storage, shelf life, opening/closing, drying, dissolution, extraction, instrument calibration, and data evaluation. Prices, frequently asked questions, and uncertainty budget also will be considered.

**Keywords**: Reference materials, practical use, quality control, uncertainty budget

**Peter Fodor** is Professor and Head of the Department of Applied Chemistry at Szent István University and chair of the 2005 European Winter Conference on Plasma Spectrochemistry. He received has PhD from the Technical University in Budapest in 1974, and he has published 125 papers in trace element analysis of environmental samples, sampling and sample preparation, development of speciation methods, food analysis, and validation and quality control of analytical measurements.

**SA-14 Determination of Plutonium by ICP-MS**, January 2, 8 am, Michael E. Ketterer, Department of Chemistry Northern Arizona University, Box 5698, Flagstaff, AZ 86011-5698 [michael.ketterer@nau.edu]

The how and why of using quadrupole and sector ICP-MS for Pu determinations will be presented. This course will describe types of samples, sample treatment methods, separation/preconcentration procedures, and ICP-MS strategies. Methods for determining the activities of Pu by isotope dilution procedures as well as Pu isotopic compositions will be described. The merits of ICP-MS compared to decay counting and other MS approaches will be discussed. Various case studies and applications will be presented, including isotopic fingerprinting of local/regional sources, sediment chronology, and soil erosion/transport studies.

**Keywords**: Plutonium analysis, ICP-MS, isotope dilution, isotope ratios, case studies, fingerprinting

**Michael E. Ketterer** received his undergraduate education at the University of Notre Dame (BS, Chemistry, 1980) and earned a PhD in Analytical Chemistry in 1985 from the University of Colorado. His PhD research was in the area of electroanalytical chemistry, but he now considers himself a "recovering electrochemist". He was employed in industry for two years, then he worked from 1987-1993 at the USEPA's National Enforcement Investigations Center. In 1988, while employed at EPA-NEIC, he began working with quadrupole ICPMS. From 1993-1998 he was Assistant Professor of Chemistry at John Carroll University, and in 1998 he moved to Northern Arizona University, where he is currently Associate Professor of Chemistry. He now manages a laboratory equipped with a VG Axiom sector ICPMS and a VG PQII quadrupole ICPMS; current research interests are in isotopic measurements and studies of naturally occurring and artificial radionuclides in the environment.

**SA-15 Understanding and Implementing ICP-AES Methods 200.7 and 6010B**, January 2, 8 am, Deborah K. Bradshaw, Atomic Spectroscopy Training and Consulting, P.O. Box 536307, Orlando, FL 32853-6307 [70454.151@compuserve.com]

Producing data on any instrument for any type of sample is not difficult. Producing accurate data, however, is often not as simple as accepting the numerical data shown on the instrument's controller. Method development for certain types of samples can become complicated and time consuming. Part of the method development process is the validation of data. There are two methods, EPA Method 200.7 and 6010B, which are commonly used for the determination of elements by inductively coupled plasma atomic emission spectroscopy, which describe to the analyst how to detect and compensate for problems and interferences which can occur during analysis. These methods are used not only by environmental laboratories but also by all types of laboratories around the world to produce and validate results. This course will outline the steps of method development and then describe the elements of 200.7 and 6010B for data validation. Included will be a discussion of interelement corrections and multivariate calibration techniques to compensate for spectral interferences.

**Keywords**: Method 200.7, Method 6010B, ICP-AES, interelement correction, multivariate calibration, method development

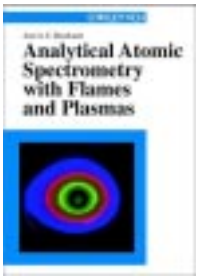
## Instrumentation

**SI-01 Calibration and Data Evaluation in Atomic Spectrometry**, January 4, 8 am, José Broekaert, Universität Hamburg, Institut für Anorganische und Angewandte Chemie, Martin-Luther-King-Platz 6, D-20146 Hamburg, Germany [jose.broekaert@chemie.uni-hamburg.de]

Procedures will be described for calibration in plasma spectrochemical analysis including statistical evaluation of data, calibration by standard addition, use of internal and external standards and procedures for the acquisition of the spectral background and spectral interferences (additive interferences) and of matrix enhancements and depressions (multiplicative interferences). Detection limits and determination limits as well as noise and signal-to-noise in spectrochemistry will be defined and their determination discussed. The concept of traceability will be introduced. Methods for optimization (trial and error, Simplex) and chemometrics (data display, clustering and multivariate analysis) will be covered. Examples from ICP-AES/MS with solutions, slurry nebulization ICP-AES, MIP-AES, glow discharge atomic spectrometry, extraction and HPLC based separations and speciation work will be discussed.

**Keywords**: Calibration procedures, background correction, detection limits, Simplex optimization, traceability, data treatment, clustering

**José A.C. Broekaert** studied chemistry at the University of Gent, Belgium, and received a PhD in 1976. He was an Alexander-von-Humboldt Research Fellow in Germany in 1977 and from 1978 to 1991 a researcher at the Institut für Spektrochemie und Ange-wandte Spektroskopie (ISAS), Dortmund, Germany. Since 1983 he lectured graduate research course in atomic spectrometry at the University of Antwerp. He received a Doctor of Science degree at the University of Antwerp in 1985. From 1991 to 1998 he was Professor of Inorganic/Analytical Chemistry at the University of Dortmund. From 1998 to 2002 he was Professor of Analytical Chemistry at the University of Leipzig, and since April 2002 he is Professor at the University of Hamburg. In 1998 he was Visiting Fulbright Research Scholar at Indiana University. His research interests include analytical chemistry with special reference to atomic spectrometry with plasma discharges (ICP, MIP, GD) and interests in sample introduction, speciation and material analysis. He is member of the editorial boards of *Applied Spectroscopy* and *ICP Information Newsletter*, and of editorial advisory boards of *Analytical and Bioanalytical Chemistry* and *Spectrochimica Acta*, Part B. He is (co)author of 270 papers/chapters/books including a textbook *Analytical Atomic Spectrometry with Flames and Plasmas* (Wiley-VCH, 2002).




**SI-02 Method Validation and Measurement Uncertainty: Advanced Concepts in Analytical Quality Assurance**, January 3, 8 am, Wolfhard Wegscheider, General and Analytical Chemistry, University of Leoben, Franz-Josef-Strasse 18, A-8700 Leoben, Austria [wegschei@unileoben.ac.at]

Validation is becoming increasingly important in most applications areas of atomic spectrometry. In general it is only vaguely defined as "experimental evidence that a procedure produces scientifically meaningful results under the conditions applied." It will be shown how various analytical figures-of-merit have to be established on "real" samples with economical and efficient experimental approaches, including accuracy and robustness. Different levels of validation will be introduced according to the goal of the particular analytical procedure thereby minimizing necessary resources. Also criteria for revalidation will be discussed. The driving force that defines the analytical approach is the required (or implied) uncertainty that needs to be realized. The concept of uncertainty that reaches well beyond classical statistical approaches (*e.g.*, confidence limits) will be taught with atomic emission, atomic absorption, and plasma-mass spectrometric examples.

**Keywords**: Quality assurance, ruggedness, comparability, sampling, sample preparation

**SI-03 High Resolution ICP-MS**, January 2, 7 pm, Norbert Jakubowski, Institut für Spektrochemie und Angewandte, Postfach 101352, D-44013, Dortmund, Germany [jakubowski@isas-dortmund.de]

This course is an introduction to ICP-MS with a double focusing magnetic sector mass analyzer. It offers fundamental background, a thorough discussion of analytical features, and state of the art information on applications. Different types of double focusing instruments also are considered. Specific topics include fundamental aspects of ICP-MS (physical

properties of a double focusing instrument, operational characteristics in comparison with quadrupole instruments); analytical characteristics (spectral and non-spectral interferences, figures of merit in low and high resolution modes, blanks and memory effects, HPLC and GC interfaces), and applications (industrial including ultra-pure reagents and alloys, environmental, geological, and biomedical materials).

**Keywords**: High-resolution ICP-MS, figures of merit, interfaces, applications, ultra-trace analysis

**SI-04 Glow Discharge Spectrometry**, January 3, 7 pm, Maria Betti, European Commission, JRC-ITU, PO Box 2340, D-76125 Karlsruhe, Germany [betti@itu.fzk.de]; Volker Hoffmann, IFW Dresden, PO Box 270116, D-01069 Dresden, Germany [v.hoffmann@ifw-dresden.de]; Norbert Jakubowski, Institut für Spektrochemie und Angewandte, Postfach 101352, D-44013, Dortmund, Germany [jakubowski@isas-dortmund.de], and Ken Marcus, Department of Chemistry, Clemson University, Clemson, SC 29634-0973 [marcusr@clemson.edu]

This course is designed to serve as an introduction to the fundamental operating principles of glow discharge devices and their applications in atomic emission (GD-AES) and mass spectrometries (GDMS) and will be given by four international experts. Hard- and software (quantification) will be explained and applications will be compared with other methods of direct solids elemental analysis. Analytical figures of merit for the two spectrometric methods are discussed. Direct current, radio frequency and pulsed glow discharges will be described with respect to the plasma and electrical discharge parameters. Finally, the session will be concluded with a discussion of future trends in instrumentation and applications.

**Keywords**: Glow discharge, atomic emission, mass spectrometry, elemental analysis

**SI-05 Time-of-Flight Mass Spectrometry for Elemental Analysis**, January 4, 8 am, Gary M. Hieftje, Department of Chemistry, Indiana University, 800 E. Kirkwood Avenue, Bloomington, IN 47405-7102 [hieftje@indiana.edu]

The utility and future potential of time-of-flight mass spectrometry (TOFMS) as a tool for elemental analysis seem now to be widely accepted. The features of the technique and its promise have been underscored by the introduction of commercial ICP-TOFMS instrumentation and by the sale of a number of such instruments in laboratories throughout the world. Among the simplest of mass-spectrometric techniques, TOFMS offers exceptionally high ion-transmission efficiency, spectral-generation rates beyond 20,000 per second, mass-spectral resolving power of 2,000, extremely high abundance sensitivity, and relative low cost. Moreover, because each packet of ions is sampled from the plasma source at virtually the same instant, ion signals can be ratioed to improve precision for all isotopes or elements at the same time. In this short course the fundamentals of TOFMS will be reviewed, instrumental requirements will be set down, and interfacing of the TOFMS to ICPs, glow discharges, and other sources will be detailed. Methods by which resolving power and ion throughput can be increased will be described and future generations of TOFMS systems will be suggested.

**Keywords**: Time-of-flight, mass spectrometry, elemental analysis, ICP-MS, GD-MS, instrumentation

**Gary M. Hieftje** is Distinguished Professor and Mann Chair of Chemistry at Indiana University in Bloomington, Indiana. His research interests include the investigation of basic mechanisms in atomic emission, absorption, fluorescence and mass spectrometric analysis, and the development of atomic methods of analysis. He is interested also in the on-line computer control of chemical instrumentation and experiments, the use of time-resolved luminescence processes for analysis, the application of information theory to analytical chemistry, analytical mass spectrometry, near-infrared reflectance analysis, and the use of stochastic processes to extract basic and kinetic chemical information. He currently serves on the editorial boards of various journals including *Analytica Chimica Acta*, *Journal of Analytical Atomic Spectroscopy*, *Journal of Mass Spectrometry*, *Laboratory Microcomputer*, *Spectrochimica Acta, Part B*, *Advances in Inorganic Mass Spectrometry*, *Talanta*, and *Spectroscopy and Spectral Analysis*. He has received numerous awards, and he was chairman (1985-86) of the Analytical Division of the American Chemical Society. In 1991 he served as President of the Society for Applied Spectroscopy. From 1999-2000 he served as Director of the newly established Linda and Jack Gill Center for Instrumentation and Measurement Science at Indiana University and was the first holder of an endowed Gill Chair. In 2000 he was appointed to the Robert and Marjorie Mann Chair of Chemistry. Most recently, he was the 2000-2001 Indiana Academy of Science Speaker of the Year, and the recipient of the 2001 Pittsburgh Spectroscopy Award. Hieftje is the author of over 400 scientific publications, 10 books, and holds 13 patents. Over 50 students have received doctorates under his direction.

**SI-06 ICP-Mass Spectrometry I: Introduction**, January 3, 8 am, R. Sam Houk, Department of Chemistry, Ames Laboratory-USDOE, Iowa State University, Ames, IA 50011 [rshouk@iastate.edu]

This course is intended mainly for the newcomer to ICP-MS. ICP characteristics as an ion source, ion extraction, operating principles of ion optics, ion focusing, quadrupole and sector mass analysis, and detectors will be described. The general analytical capabilities, applications survey, and an introduction to matrix effects will be presented.

**Keywords:** ICP-MS characteristics, instrumentation, interferences, applications

**SI-07 ICP-Mass Spectrometry II: Advanced Topics**, January 3, 1 pm, R. Sam Houk, Department of Chemistry, Ames Laboratory-USDOE, Iowa State University, Ames, IA 50011 [rshouk@iastate.edu]

This course is intended for those who complete Part I and for the experienced ICP-MS user. Detailed consideration will be given to basic cases of matrix effects, removal of polyatomic ion interferences (solvent removal, collisional dissociation, high resolution, cool plasma), alternate mass analyzers, solid sampling, analysis of limited solution volumes, and combining ICP-MS with chromatography for speciation and removal of interferences.

**Keywords:** ICP-MS operation and measurement effects, interference corrections, sampling, chromatography

**SI-08 Laboratory Accreditation for Plasma Spectrochemistry**, January 2, 1 pm, Vahid Majidi, Chemistry Division, Los Alamos National Laboratory, Los Alamos, NM 87545 [majidi@lanl.gov]

Recently several organizations have combined their requirements to unify the accreditation programs for chemical analysis. The leading example is the European based ISO standards for record keeping and documentation for analytical procedures and a similar program the American Association of Laboratory Accreditation in the US. This course will outline the general requirements for laboratory accreditations according to ISO and A2LA standards. A detailed comparison of quality programs and Six-Sigma performance based program will be presented. The origins of laboratory certification programs and examples will be described.

**Keywords**: Laboratory certification, accreditation, ISO, A2LA, record keeping, documentation

**SI-09 Field Flow Fractionation - Inductively Coupled Plasma Mass Spectrometry/Atomic Spectrometry**, January 4, 8 am, Ronald Beckett, Water Studies Centre, School of Chemistry, Monash University, P.O. Box 23, Melbourne, Victoria 3800, Australia [ron.beckett@sci.monash.edu.au]

This course will outline a new set of hyphenated analytical methods: field-flow fractionation (FFF) - inductively coupled plasma mass spectrometry/atomic spectrophotometry. This method enables the measurement of the elemental composition across the size distribution of particulate and macromolecular samples. Thus it yields size-based element speciation data applicable to a wide range of samples and applications. The course will concentrate on the use of FFF methods and the detailed information that can be derived from the combined instruments. The course will examine the choice of equipment and run conditions for a given sample and data analysis. Commercial instrumentation should be available for demonstration. Conventional on-line and off-line detectors will be compared, and ICP-MS with quadrupole and high-resolution instruments will be used to illustrate practical examples with biological, environmental, geological, polymer, and other sample types. Comparison with chromatographic and electrophoretic separations will be highlighted for elemental speciation.

**Keywords:** FFF, ICP-MS, water, soils, sediments, particle sizing, elemental speciation

**SI-10 Matrix Effects in ICP-AES and MS: Causes and Cures, Methods and Software**, January 3, 7 pm, Eric Salin, Department of Chemistry, McGill University, 801 Sherbrooke St. W., Montreal, PQ H3A 2K6, Canada [eric.salin@ mcgill.ca], and José Todoli, Department of Analytical Chemistry, University of Alicante, P.O. Box 88, E-03080 Alicante, Spain [jose.todoli@ua.es]

The physical and chemical causes of matrix effects for ICP-AES and ICP-MS will be presented. These range from aerosol generation phenomena (*e.g.*, acid effects) through transport phenomena to the effects of easily ionizable species. The effects can be quite different between ICP-AES and ICP-MS, and these differences will be discussed. We will also discuss methods of determining when there are likely to be matrix effects, including the use of some commercial software for that purpose, and then the selection of techniques for the minimizing of matrix effects.

**Keywords:** Matrix effects, aerosol generation, transport, detection, minimization

**SI-11 Selecting an ICP-AES System**, January 2, 7 pm, Kenneth J. Fredeen, NeuTech Consulting, 25 Horizon Court, Monroe, CT 06468 [kjfredeen@neutechconsulting.com, www.neutechconsulting.com]

This course is directed toward those considering the purchase of an ICP - atomic emission spectrometry system, particularly if they are a first-time buyer or are not fully familiar with the latest advancements in ICP-AES technology. The course begins with a brief discussion of the general considerations involved in an instrument purchase. This is followed by an overview of the wide range of ICP-AES-specific choices the instrument selector will need to make, along with some suggested approaches to use in evaluating and comparing systems. Next is a discussion of analytical performance and figures of merit for ICP-AES and how these are affected by various designs and technologies. The majority of the course is then devoted to in-depth technical discussions of different ICP-AES designs, the latest models and innovations that are commercially available, and their respective strengths and weaknesses as they relate to system performance. Particular attention will be given to spectrometer designs, PMT's *vs.* solid-state detectors, radial *vs.* axial viewing, and methods for interference avoidance and correction.

**Keywords:** ICP-AES, instrument selection, system comparisons, performance, installation, operation

**Kenneth J. Fredeen** founded NeuTech Consulting in 2000, with the mission of helping technology-based companies achieve business success through the use of advanced product, marketing, and business strategies. Prior to this, he held several positions both practicing and managing ICP-AES and ICP-MS product development and technical marketing at PerkinElmer, starting in 1985 as a technical specialist and rising to the position of director of the

environmental and applied inorganic systems strategic business unit. He is the co-author, along with Charles Boss, of the popular primer *Concepts, Instrumentation, and Techniques in ICP-AES*, which has over 10,000 copies in circulation. Ken received a PhD in analytical chemistry from Texas A&M University in 1985 and a BA in chemistry and business from Thiel College in 1980. As a senior at Thiel, he reviewed an article on ICP-AES by Jim McLaren, Scott Willie, *et al.*, for a seminar class. To this, he credits/blames his career-long interest in ICP technology.

**SI-12 Selecting an ICP-MS System**, January 4, 7 pm, Rob Thomas, Scientific Solutions, 4615 Sundown Rd., Gaithersburg, MD 20882 [thomasrj@bellatlantic.net]

This course is directed toward those considering the purchase of an ICP - mass spectrometry system, particularly for those about to purchase their first ICP system. An overview of the types, makes, and models of ICP - MS instruments will be first presented and discussed with emphasis on their application to the needs of various types of analytical laboratories. Answers to key questions leading to a purchase decision will be presented: Should I purchase a TOF, quadrupole, or sector field MS system? Would a low-cost system perform as well for me as a higher-priced system? How much mass resolution do I really need? What capabilities should the analytical software provide? What attachments should I consider buying? Performance specifications, instrument installation, and service also will be discussed. Information of the latest innovation in commercial instrumentation will be presented.

**Keywords:** ICP-MS, instrument selection, system comparisons, performance, installation, operation

**SI-13 Evaluation and Control of ICP-AES and ICP-MS Systems**, January 3, 1 pm, Jean-Michel Mermet, University of Lyon I, Laboratoire des Sciences Analytiques, Batiment 308, F-69622 Villeurbanne Cedex, France [mermet@cpe.fr], and Eric Salin, Department of Chemistry, McGill University, 801 Sherbrooke St. W., Montreal, QC H3A 2K6, Canada [eric.salin@mcgill.ca]

This course will describe simple experiments to control ICP-AES ad ICP-MS systems, to identify possible causes of degradation of the results, and to evaluate the analytical performance. These experiments allow the ICP-AES user to verify practical resolution, efficiency of atomization and ionization, light absorption, stability and efficiency of the sample introduction system, limits of detection and drift, and the ICP-MS user to verify resolution, energy transfer, mass calibration, mass response and mass stability, stability and efficiency of the sample introduction system, and limits of detection. A sequential procedure will be described to verify each major part of the ICP system. Examples based on the use of commercially available ICP systems will be given. Software approaches will be discussed.

**Keywords:** Control, diagnostics, analytical performance, testing, expert system, diagnostic system, software

**SI-14 Reaction Cells and Collision Cells for ICP-MS**, January 2, 1 pm, Dmitry Bandura [dmitrybandura@sciex.com], Vladimir Baranov [vladimir.baranov@sciex.com], and Scott Tanner [tannersd@sciex.com], PE-Sciex, 71 Four Valley Dr., Concord, ON L4K 4V8, Canada

The design and operation of reaction cells and collision cells used for isobaric interference removal in ICP-MS will be discussed. The course begins with an introduction to the principals and kinetics of ion-molecule reactions and the operation of the rf devices (quadrupoles, hexapoles, octapoles, *etc.*). The various efficiencies of the ion chemistry ((primarily ion reactivity, reactivity, production of the ions within the cell) will be evaluated, concluding that where high efficiency of he primary chemistry is obtained, reaction of the analyte ion with impurities and the formation of new interferences within the cell becomes important. Various means of suppressing these effects, including kinetic energy discrimination and band pass operation of the cell will be contrasted and compared, and effects related to the order of the multipole device will be considered. Examples of the application of reaction cell and collisions cell methods in the semiconductor, environmental, clinical, geochemical and isotopic analysis will be presented.

**Keywords:** Collision cell, reaction cell, spectral interference, chemical resolution, pressurized multipole, chemistry, ion dynamics, ion-molecule chemistry, in-cell produced interferences, multipole operating point, energy discrimination

## Sample Introduction

**SS-01 Liquid and Solid Micro- and Nano-samples by ICP Spectrometry**, January 3, 7 pm, Vassili Karanassios, Department of Chemistry, University of Waterloo, Waterloo, ON N2L 3G1, Canada [vkaranassios@uwaterloo.ca]

There are many cases in which only a small amount of a liquid or a solid is available for analysis (*e.g.*, a few microliters or nanoliters). Examples abound in biological and clinical analyses. Often digestion of small amounts of solids is not possible, thus these samples must be analyzed directly (*i.e.*, with minimum or no sample pretreatment). Overall, analysis of minute amounts of "discrete" liquid or solid samples requires use of specialized sample introduction systems. Typically it necessitates the use of specialized readout electronics. In the course, micro- and nano-sample introduction systems for ICP spectrometry will be reviewed; their strengths, limitations and current capabilities will be described in detail (with particular emphasis on in-torch vaporization ICP-AES and ICP-MS); method development will be discussed, and future directions will be outlined.

**Keywords:** ICP-AES, ICP-MS, sample introduction, micro- and nano-samples

**SS-02 Electrothermal Vaporization for Atomic and Mass Spectrometry**, January 4, 1 pm, D. Conrad Grégoire, Geological Survey of Canada, 601 Booth St., Room 759, Ottawa, ON K1A 0E8, Canada [gregoire@nrcan.gc.ca]

The application of electrothermal vaporization techniques (ETV) for the ultra-trace analysis of micro samples will be covered. The main emphasis, particularly for the analysis of real samples, will be on ICP mass spectrometry. In ETV liquid or solid samples are heated in a graphite tube or on a filament made of metal or graphite. Vaporized material is carried to the argon plasma by a stream of argon gas. Covered in this course will be ETV instrumentation, the principle of operation of ETV, background spectral features in ETV-ICP-MS, the mechanisms of analyte vaporization, chemical modification and the use of physical carriers, non-spectroscopic interferences, and specific applications that highlight the analytical domain of ETV-ICP-MS.

**Keywords**: Electrothermal vaporization, ICP emission spectrometry, ICP mass spectrometry, micro-analysis, trace analysis, isotope ratio determination

**SS-03 Flow Injection Analysis Techniques and Applications**, January 4, 1 pm, Maria Fernanda Giné, CENA, University of Sao Paulo, Priacicaba, SP 13400970, Brazil [mfgine@cena.usp.br]

The fundamentals of flow injection analysis (FIA) and the benefits of coupling to plasma instrumentations will be outlined. The state of the art of flow injection instrumentation and their performance in large-scale routine analysis is well established in several laboratories today. The course will provide information about strategies for sample pre-treatment using flow systems especially when the determination of trace elements in different samples is desired. The efficiency of manifolds for coupling flow systems to ICP instruments to achieve analyte preconcentration, matrix separation, hydride generation, programmed dilutions, standard additions, and isotope dilution will be presented.

**Keywords:** Flow injection, sample introduction, laboratory automation, preconcentration, hydride generation

**SS-04 Micronebulizer Diagnostics and Analytical and Fundamental Characteristics**, January 3, 7 pm, Akbar Montaser, Department of Chemistry, George Washington University, 725 21st St., Washington, DC, 20052 [montaser@gwu.edu]

This short course deals with the introduction of micro- and nanoliter quantity of test samples into plasmas and relevant aerosol diagnostic techniques essential for gaining improved fundamental understanding of aerosol to achieve ultimate analytical performance indices in plasma spectrochemical measurements. A fundamental knowledge of the properties and limitations of the sample introduction system and the plasma is important in conducting viable spectrochemical analyses. Recent research on several micronebulizers is reviewed, along with the most common micronebulizers and desolvation approaches that are used in plasma spectrometry. However, direct injection nebulizers are stressed as well since the design of these devices not only conserves samples, but also reduces memory effect and band broadening in chromatographic separations. Further, current benefits and limitations of micronebulizers and direct injection devices and aerosol diagnostic technique are also summarized.

**Keywords:** Low-sample consumption, nebulizers, spray chambers, desolvation, aerosol diagnostics, droplet size, modeling, transport efficiency

**SS-05 Laser Ablation Mass Spectrometry I Introduction**, January 2, 1 pm, Henry Longerich, Department of Earth Sciences, Memorial University, St. John's NL A1B 3X5, Canada [henry@esd.mun.ca], and Detlef Günther, Laboratory of Inorganic Chemistry – Elemental and Trace Analysis, ETH Hönggerberg, HCI, G113, CH-8093 Zürich, Switzerland, [guenther@inorg.chem.ethz.ch, www.analytica.ethz.ch]

The course is designed to give participants an introduction to the analytical capabilities of laser ablation - inductively coupled plasma spectrometry and should be of particular benefit to spectroscopists interested in developing a laser ablation facility. LA-ICP-MS has become one of the most common solid sampling technique for major, minor and trace element analysis. The course will explain how LA-ICP-MS works. Details about basics in lasers and ICP-MS instrumentation and their combination will be explained. Examples for transient data acquisition, method development, and a large number of applications will be discussed to give a feel for the quantification capabilities of this analytical technique. Topics also will include terms and terminology, laser selection, ablation cell design and interfacing, ablation processes, transport phenomena, and measurement systems. Participants do not need previous knowledge about this technique.

**Keywords:** Lasers, ablation, aerosol transport systems, carrier gas, calibration, atomization and ionization, ICP-MS, interface, applications

**Henry Longerich** graduated from Indiana University, with a PhD in Analytical Chemistry. He joined the chemistry faculty at the University of Alaska in Fairbanks, and he then did post doctoral work at Dalhousie University in Halifax, Nova Scotia, Canada. Henry then moved to Memorial University of Newfoundland, where he is now holds the title of Professor Emeritus in the Department of Earth Sciences. He was responsible for electron probe X-ray microanalysis, and X-ray fluorescence instrumentation along with supporting the development of computerization in the department. Henry became involved with ICP-MS in 1984 when he was responsible for the installation of an ELAN 250 instrument, which was the tenth ELAN 250 instrument sold and installed by Sciex. After several years of developing solution nebulization methods for geoscience and environmental applications, the Memorial University research group obtained funding in 1988 to build a micro sampling laser ablation (LA) system to use with the ICP-MS. The landmark 1992 LA paper (Jackson, Longerich, *et. al, Canadian Mineralogist*, **30**, 1049-1064), which received the Hawley Medal for the best paper of the year in the *Canadian Mineralogist*, contributed significantly to the establishment of LA micro sampling in the earth sciences. It was clearly shown in this paper that the 1064 nm Nd:YAG laser used was not optimum, especially for samples, which were transparent at this wavelength. This paper suggested, "Use of different wavelengths of the laser can be expected to allow further improvement ...". This led to the development of a frequency quadrupled 266 nm

system, and later in 1998 to the publication of the first report using a quintupled 213 nm system (Jeffries, Jackson, and Longerich, *JAAS*, **13**, 935-940). In 1996 Henry took a voluntary early retirement from Memorial University, where he continues to have students and carry on funded research. While not in residence in Newfoundland, Henry has become an "itinerate" professor, doing research and teaching at the University of Alberta, Chemex Laboratories, St. Francis Xavier University, and most recently at Trent University. Dr. Longerich is Visiting Professor (until May 15, 2003), Department of Chemistry, Trent University, 1600 West Bank Drive, Peterborough, Ontario K9J 7B8, Canada

**SS-06 Laser Ablation Mass Spectrometry II Advanced**, January 2, 7 pm, Detlef Günther and Christopher Latkoczy, Laboratory of Inorganic Chemistry – Elemental and Trace Analysis, ETH Hönggerberg, HCI, G113, CH-8093 Zürich, Switzerland, [guenther@inorg.chem.ethz.ch, www.analytica.ethz.ch], and Henry Longerich, Department of Earth Sciences, Memorial University, St. John's NL A1B 3X5, Canada [henry@esd.mun.ca]

The course will provide detailed knowledge about recent instrumentation and method developments in LA-ICP-MS. Various problems in laser sample interaction, aerosol transport, and atomization and ionization will be discussed. Elemental fractionation, its source, and various strategies to overcome this problem for different laser and ICP-MS systems will be extensively discussed. Furthermore, different quantification strategies and non-matrix matched calibration examples will be given. A few non-routine applications will also be discussed. Participants should have some knowledge or practical experience with LA-ICP-MS or should have taken the basic LA-ICP-MS course (SS-05).

**Keywords:** Laser-sample interaction, elemental fractionation, aerosol size and aerosol transport, atomization and excitation, ICP-MS, interface and ICP-optimization

**SS-07 Nebulizer Characteristics, Design, and Routine Operation for ICP-AES and ICP/MS**, January 3, 1 pm, Richard F. Browner, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA 30332-0400 [rick.browner@chemistry.gatech.edu]

The operating principles of all nebulizers suitable for ICPAES and ICP/MS will be described, including pneumatic, ultrasonic, Babington-type jet, fritted disk, thermospray, and electrospray nebulizers. The fundamental physics of the various nebulization processes will be discussed in terms of resulting particle size distributions of the aerosols, and these properties related to analytical benchmarks, such as detection limits, precision, and interference effects. New and established nebulizer designs will be compared with particular reference to practical aspects of operation and maintenance. The effect of using aqueous and organic solvents, as well as the effects of surfactants, strong acids and high matrix compositions will be discussed, as will the interactions of aerosols with various spray chamber types.

**Keywords:** Nebulizer design, pneumatic, ultrasonic, thermospray, electrospray, aerosols

**SS-08 Plasma Spectroscopic Detection in Chromatography**, January 4, 1 pm, Peter C. Uden, Department of Chemistry, 701 Lederle Graduate Research Center, University of Massachusetts, 710 N. Pleasant St., Amherst, MA 01003-9336 [pcuden@chem.umass.edu]

This course will present fundamentals and applications of element selective chromatographic detection methods utilizing atomic plasma spectrometric detection sources. It will cover chromatographic techniques for gas, supercritical fluid, and liquid mobile phase separations, interfacing considerations and will review the range of atomic plasmas used. Discussion on interfaced chromatography and plasma mass spectrometry will also be included. Applications from a wide range of inorganic and organic chromatographic analysis will be discussed covering polymer and macromolecular, biochemical, clinical, environmental, and materials science areas.

**Keywords:** Chromatographic interfacing, element selectivity, characterization detection, elemental analysis, formula measurement

**SS-09 Sample Introduction for ICP-AES and ICP/MS**, January 2, 1 pm, Richard F. Browner, School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, GA 30332-0400 [rick.browner@chemistry.gatech.edu]

Sample introduction basics will be covered for ICP-AES and ICP-MS, and contrasts drawn between the two systems. All commonly used approaches will be covered, including: (1) pneumatic and ultrasonic nebulization, (2) hydride and other vapor generation techniques, (3) electrothermal vaporization, and (4) laser vaporization. The influence of aqueous and organic solvents will be compared, as well as the effect of desolvation on signals, detection limits, and oxide levels in ICP/MS. The key parameters for optimum interfacing with liquid chromatography and flow injection introduction will be discussed.

**Keywords:** Sample introduction, nebulizers, LC and FIA interfacing, desolvation

**SS-10 Solid Sample Introduction Techniques and Instrumentation**, January 4, 7 pm, Nimal De Silva, Department of Chemistry, Carleton University, Ottawa, ON K1S 5B6, Canada [ndesilva@ccs.carleton.ca]

Direct analysis of solids using plasma sources is an attractive alternative to sample dissolution for many difficult matrices. Most of the currently available techniques are complementary rather than competitive depending on the application. This course will begin with a critical overview of techniques and instrumentation available for direct solid analysis by ICP-AES and ICP-MS. Emphasis will be placed on the direct powder introduction (DPI) technique. With modern spectrometers DPI-ICP can be a powerful tech-

nique for analysis of individual particles to bulk powders of virtually any matrix type. DPI instrumentation, data acquisition strategies for different spectrometers, and data processing procedures for exploiting DPI-ICP as a fast tool for conventional bulk analysis and for simultaneously extracting unconventional information (elemental association, heterogeneity) will be discussed with applications.

**Keywords:** Direct solid analysis, powder introduction, particles, heterogeneity, ICP-AES, ICP-MS

## Plasma Spectrochemical Techniques

**ST-01 Advanced Sample Preparation for Plasma Spectrometry**, January 3, 8 am, Mark Tatro, Spectra, Inc., 137 South Street Ext., Warwick, NY 10990-1126 [spectra9@optonline.net]

The development of sample preparation techniques that result in a complete solution, retention of volatile elements, reduced contamination from the vessel and the atmosphere, low reagent blanks, and speed is one of the weakest links in ICP analyses. At this time a universal sample preparation technique does not exist. This course will address (1) the requirements for the development of sample preparation methods; (2) recent innovations in decomposition techniques, and (3) recent innovations in dissolution techniques as they apply to plasma spectrometry. Applications using these techniques will be stressed.

**Keywords:** Systematic error, contamination, storage, decomposition, dissolution, high pressure digestion, microwave digestion, fusion

**Mark E. Tatro** is founder and president of Spectra Spectroscopy & Chromatography Specialists, Inc. and Spectrasol, Inc. Since 1981 Tatro has been providing on-site methods development training courses for AAS, ICP and ICP-MS applications as well as for sample preparation methods. This has allowed him to see first hand both the innovations and errors in trace metal analyses found in thousands of laboratories around the world. Tatro served as editor of the column "Atomic Spectroscopy Advances" for *Spectroscopy* magazine from 1985 to 1991 and served on the editorial advisory boards for *American Environmental Laboratory* and *Environmental Testing & Analysis*.

**ST-02 Applications of Isotope Dilutions and Isotopic Measurements**, January 4, 7 pm, Brad Esser, Lawrence Livermore National Laboratory, P.O. Box 808 MS-L310, University of California, Livermore, CA 94550 [esser1@llnl.gov]

This course will begin with an introduction to the constancy and variations of isotopic abundances as observed in nature. Then practical applications of isotopic measurements and the use of isotope dilution will be covered. The uses and limitation of ICP-MS for these measurements will be discussed and compared to other methods. Instrumental parameters of concern for precise isotopic measurements and the basic equations for dead time, mass bias, and isotope dilution will be presented.

**Keywords**: Isotopes, isotope dilution, isotope ratios, applications, mass bias, dead time, tracers

**ST-03 Plasmas on a Chip: Microplasma Devices**, January 4, 1 pm, Vassili Karanassios, Department of Chemistry, University of Waterloo, Waterloo, ON N2L 3G1, Canada [vkaranassios@uwaterloo.ca]

There is an increasing interest in small-size plasma sources that can be operated on microchips. Beside the obvious goals of reducing size, weight, and power- and gas-consumption, miniaturization offers additional advantages. Included in these are low cost, portability, and potential for mass production. To take advantages of these benefits, attempts at fabricating micro-plasmas have already been made, and fabrication of many types of miniaturized plasma sources has been reported. In this course the state-of-the-art will be reviewed; micro-machining technology used for fabrication of plasma sources will be described in detail; the question of how to introduce an initially ambient temperature gas, liquid, or solid sample into a gas-phase micro-plasma will be addressed. Future directions will be outlined.

**Keywords:** Micro-plasmas, fabrication technology, micromachining, microfluidics

**ST-04 Element Preconcentration in Trace Analysis**, January 6, 7 pm, Günter Knapp, Department of Analytical Chemistry, Graz University of Technology, Technikerstrasse 4, A-8010 Graz, Austria [knapp@analytchem.tu-graz.ac.at]

Various methods for the enrichment of trace elements and separation of matrix constituents considerably enhance the field of application for atomic absorption and plasma emission spectrometry. Enrichment factors of one to two orders of magnitude can be achieved if the appropriate enrichment methods are applied. Better detection limits and less interferences are the consequence. By separating the sample matrix (*i.e.*, high salt content), disturbances of the measurement can be eliminated. This course consists of three parts: (1) a summary of the whole field of element enrichment (volatilization, liquid-liquid extraction, selective dissolution, precipitation, electrochemical deposition, sorption, ion exchange, flotation, and freeze drying); (2) practical examples for various field of application, and (3) automated, on-line preconcentration for AAS, ICP-AES, and ICP-MS.

**Keywords:** Preconcentration, enrichment, matrix separation, trace analysis

**ST-05 Glow Discharge Modeling: What Does It Tell Us About the Glow Discharge Plasma?** January 4, 1 pm, Annemie Bogaerts, University of Antwerp (UIA), Department of Chemistry, Universiteitsplein 1, B-2610 Wilrijk-Antwerp, Belgium [bogaerts@uia.ua.ac.be]

After an introduction describing the fundamentals of glow discharges (important species and reactions), an overview will be given of the different models that can be used for glow discharges and other related non LTE plasmas (and have been used in the literature for other applications), with their advantages and disadvantages (*i.e.*, analytical approaches, fluid models, Boltzmann kinetic models, Monte Carlo simulations, particle-in-cell models and hybrid

techniques). Then, the model that has been developed in our group for analytical glow discharges, which is a hybrid model existing of various submodels for the various plasma species, will be explained in some more detail than is possible in a conference talk. This includes explanation of the modeling network and justification of the choice of a particular model for each kind of plasma species, processes taken into account, basics of each of the models, calculation methods, detailed coupling of the models (*e.g.*, output of one model is input for the next model). Moreover, the weak points in these models and the need for more data will be outlined. Finally, some results will be presented, with a discussion about the expected uncertainties and comparison with experiment. No prior knowledge of modeling is required.

**Keywords**: Glow discharge, modeling, hybrid model network, plasma processes, Monte Carlo, fundamentals, numerical simulations, calculation results

**Annemie Bogaerts** studied chemistry at the University of Antwerp, Belgium, and received her MSc degree in Chemistry and PhD degree in Sciences, in 1993 and 1996, respectively. She is currently a postdoctoral researcher and will become a faculty member starting October 1, 2003, at the University of Antwerp. Her research interests are the modeling of glow discharge plasmas for analytical and technological applications, of plasma-solid and ion-solid interaction, and more recently of laser-ablation.

**ST-06 Typical Errors in ICP Analyses and How to Avoid Them**, January 2, 1 pm, Mark Tatro, Spectra, Inc., 137 South Street Ext., Warwick, NY 10990 [spectra9@optonline.net]

Modern ICP spectrometers are so automated that analysts are led to believe that one has only to push the "start" button to achieve quality analytical data. Alas, such is not the case. Taking examples from 15 years of experience of providing on-site problem solving support for ICP analysis, the instructor will share his experience and insight into the more common errors made in trace metal analysis and how to avoid them. Examples are taken from areas of sample preparation, standards preparation, calibration, contamination, interferences, QA/QC, and productivity.

**Keywords**: ICP, method development, errors, problem solving, productivity, real-life examples

**ST-07 Microwave Sample Preparation for Inorganic Analysis**, January 3, 1 pm, H.M. "Skip" Kingston, Department of Chemistry and Biochemistry, Duquesne University, Pittsburgh, PA 15282 [kingston@duq.edu, skingston@metarainc.com]

This course presents both selected applications and the theoretical non-intuitive relationships in microwave sample preparation featuring acid dissolution for elemental and ultra-trace elemental analysis. Specific sample preparation for ICP-MS and ICP-AES including fundamental relationships of power, reagent temperature, pressure, matrices, chemical compatibility, and practical standard methods will also be discussed. Basic features of microwave decomposition methods, equipment, vessel design, and accessories will be covered. Methods for transfer of procedures between equipment are highlighted, and applied methods such as the new 3052 developed for EPA SW-846 for total microwave digestion of soils, sediments, ash, tissues, foods, and combination of these samples are reviewed. Safety considerations in laboratory microwave sample preparation and analysis are stressed.

**Keywords:** Microwave heating, acid dissolution, organic and inorganic sample preparation, elemental analysis, environmental analysis, microwave equipment, microwave theory, safety

**H.M. (Skip) Kingston** is Professor of Analytical Chemistry and dually appointed in the Environmental Research and Education Center at Duquesne University in Pittsburgh, PA. Dr. Kingston is also the Director of a focused research center at Duquesne University. In 2000 Dr. Kingston also became the Chief Technical Officer of Metara Inc. In 1993 he participated with others to establish the Center for Environmental Research and Education (CERE) at Duquesne University, and in 1996 he established the Center for Microwave and Analytical Chemistry (C/MAC) for transferring technology and work with industry to advance the fields analytical chemistry applications. From 1976 to 1991 he was a Supervisory Research Chemist in the Inorganic Analytical Research Division of the National Institute of Standards and Technology (NIST). From 1989 to 1991 he conceived and headed the Consortium on Automated Analytical Laboratory Systems (CAALS), which was dedicated to developing automated analytical standards. For the past several years, Dr. Kingston has been actively involved in advancing the areas of speciated, automated and microwave analysis through basic research and methods development. He has invented and authored over a dozen standard methods for EPA, NCCLS, SEMI and others organizations. He co-authored two landmark Professional Reference books for the American Chemical Society (ACS) entitled *Microwave-Enhanced Chemistry: Fundamentals, Sample Preparation and Applications*, and *Introduction to Microwave Sample Preparation: Theory and Practice* (in 1997 and 1988). Since 1987, he has received numerous awards for his pioneering work in several areas, including the 1996 R&D 100 Award for development of Speciated Isotope Dilution Mass Spectrometry (SIDMS) and the 1987 IR 100 Award for development of the microwave dissolution. He holds multiple patents in the field of (SIDMS), mass spectrometry automation, microwave enhanced chemistry, chelation chromatography, and has others pending and remains interested in the development and automation of analytical analysis methods.

**ST-08 Clean Microwave Digestions for Ultra-trace Analysis**, January 4, 7 pm, H.M. "Skip" Kingston, Department of Chemistry and Biochemistry, Duquesne University, Pittsburgh, PA 15282 [kingston@duq.edu, skingston@metarainc.com]

This course covers the use of microwave methods to permit trace and ultra-trace element analysis including the clean laboratory chemistry methods that are complementary with microwave technology. The applications covered

include the major fields of environmental, biological, botanical, geological, and semiconductor sample types. Large sample sizes and total microwave processing of samples also will be discussed. Current microwave reaction control strategies and their appropriateness to specific sample types will be evaluated. Reference tools will be provided for the attendees to assist with these procedures. Example procedures will be provided for selected applications.

**Keywords**: Microwave digestions, sample preparation, trace element analysis, clean laboratory chemistry, applications

**ST-09 Plasma Analysis of Foods and Drugs - Quality Control and Assessment Procedures**, January 4, 8 am, Fred L. Fricke and Karen A. Wolnik, Forensic Chemistry Center, U.S. Food and Drug Administration, 6751 Steger Dr., Cincinnati, OH 45237 [ffricke@ora.fda.gov, kwolnik@ora.fda.gov]

In the application of ICP-AES and ICP-MS to real-world samples, quality control procedures are necessary to assure analytical reliability. Identifying, preventing, and correcting potential sources of error in the analytical scheme require monitoring the various phases of analysis. The accuracy and utility of the results of trace and ultratrace elemental analysis employing ICP determination is affected by several factors, including sample selection, preparation and pretreatment procedures, plasma determination, and data reduction. Contamination control and the integrity of calibration standards are obviously crucial to accurate analysis. Procedures for controlling and assessing the various phases of analysis will be discussed. Examples from ICP-AES/MS analysis of forensic, pharmaceutical, food, and biological materials will be provided. A brief discussion of good laboratory practices will also be included.

**Keywords:** Quality assurance, quality control, contamination control, accuracy, reliability, method verification, quality assessment

**ST-10 Plasma Diagnostics: Fundamentals, Measurements, Applications**, January 3, 1 pm, John W. Olesik, Department of Geological Sciences, 125 S. Oval Mall, 026 Mendenhall Laboratory, Ohio State University, Columbus, OH 43210-1002 [jolesik@geology.ohio-state.edu]

Plasma diagnostic fundamentals, measurement techniques, and applications will be discussed. Plasma diagnostics will be viewed from two perspectives: understanding the basis of diagnostic measurements and fundamental processes in the plasma, and using practical diagnostics as part of sample analysis methods. Measurement of important plasma characteristics such as electron number density, temperature, and ion-to-atom ratios will be covered. Diagnostic measurements related to sample characteristics will also be described. The use of practical diagnostics to warn the instrument operator when either the instrument may be malfunctioning or a particular sample may result in an analysis error will be discussed.

**Keywords:** Plasma diagnostic measurements, ion-atom intensity ratios, electron concentration, temperature, practical diagnostics for ICP-OES and ICP-MS.

**ST-11 Trace Element Speciation**, January 3, 7 pm, Olivier F.X. Donard, Laboratoire de Chimie Bio-Inorganique et Environnement, CNRS EP 132, Université de Pau et du Pays de l'Adour, Centre Hélioparc, 2 avenue du Président Angot, F-64000 Pau, France [olivier.donard@univ-pau.fr]

The chemical forms of metals in natural, aqueous, and solid environments are of considerable interest. The approaches and techniques used to sample, preserve, and measure the chemical forms of trace elements in environmental samples will be the focus of this course. Regulatory procedures, development of methodology, and collaborative exercises also will be examined. Chromatographic and other separation techniques, generation of species-specific gases and vapors, and other approaches will be discussed. The role of plasma and furnace spectroscopic detection systems will be examined.

**Keywords**: Arsenic, chromium, mercury, tin, chemical forms, separation, speciation

**ST-12 Preparing Your Laboratory for ICP-MS**, January 4, 7 pm, Ela Bakowska, National Medical Services, 3701 Welsh Rd., Willow Grove, PA 19090 [ela.bakowska@nmslab.com]

This course is designed to assist participants in preparation of their lab when they install their first ICP-MS. The challenges associated with the ability to detect very low concentration levels can be resolved with the appropriate lab set-up. Recommendations for the choice of the water supply, clean bench, cabinets, reagents, standards and reference materials, pipetters, glassware and plasticware, and other lab items will be presented. The required purity level of the reagents will depend upon application. The cost savings choices (without compromising quality of the results) will be provided. The catalog numbers for the lab supplies will be listed, and if possible the multivendor choices will be offered.

**Keywords**: ICP-MS, lab set-up, contamination, purity, supplies

**ST-13 Contamination Issues in Trace Elemental Analysis**, January 2, 7 pm, Paul Gaines [ivtech@ivstandards.com], Inorganic Ventures, 195 Lehigh Ave., Suite 4, Lakewood, NJ 08701

State of the art atomic spectroscopic instrumentation can provide sub part per billion to part per quadrillion detection limits. Unfortunately, the ability to obtain accurate and meaningful quantitative results at these levels is often limited by contamination. This course will describe common and uncommon sources of contamination and methods to minimize their effects in trace element analysis. Topics include contamination from plastics, air, laboratory apparatus, and the environment. Trace element adsorption problems will also be discussed. Participants will be encouraged to discuss their contamination problems and experiences.

**Keywords**: Contamination, trace analysis

**Paul Gaines** has over three decades of spectroscopic

experience. After earning his Ph.D. in chemistry at Iowa State University, Paul worked in the laboratories of Exxon Research and Engineering and Union Carbide. Today, Paul is the senior chemist and CEO of Inorganic Ventures. Paul's extensive background includes atomic spectroscopy (ICP-OES, ICP-MS, XRF, flame and GFAA), ion chromatography, micro-elemental analysis, and various electrochemical, wet chemical, and separation techniques. Recognized as an innovator and troubleshooter within the chemical community, Paul is currently examining contamination and reliability issues as they pertain to trace elemental analysis.

**ST-14 Analysis of Biological Samples by High-Resolution ICP-MS**, January 4, 7 pm, Ilia Rodushkin, SGAB Analytica, Luleå University of Technology, SE-971 87 Luleå, Sweden [ilia.rodushkin@sgab.se]

This course is focused on the use of double focusing sector field inductively coupled plasma mass spectrometry (ICP-SFMS) for multielemental analysis of biological samples. It is based on our experience gained during analysis of various biological matrices on a contract basis using Finnigan MAT Element ICP-SFMS. The course includes discussion of ICP-SFMS figures of merit such as method detection limit, matrix effects, precision and accuracy in the analysis of urine, serum, whole blood, hair, nails and other biological matrices. Examples of spectral interferences are given and different contamination sources during sampling, sample preparation and analysis, as well as measures for their reduction are considered. Different approaches for accuracy evaluation including analysis of reference materials and participation in interlaboratory programs and trials are discussed.

**Keywords**: High-resolution ICP-MS, multielement analysis, biological monitoring, sample preparation, accuracy assessment, whole blood, serum, urine, hair, nails

**ST-15 Who Wants to Be a Millionaire? Bringing Your New Technology to Market**, January 3, 8 am, Kenneth J. Fredeen, NeuTech Consulting, 25 Horizon Court, Monroe, CT 06468 [kjfredeen@neutechconsulting.com, www.neutechconsulting.com]

Ever wonder why some seemingly minor innovations are wildly successful in the market while some major innovations fall flat on their face? As scientists and engineers, we tend to believe that superior technology should win, but we know that from experience that it often doesn't. Why not? This course covers some of the key elements of what it takes to be successful in bringing new technologies to market. The emphasis of the course is on concepts and principles of high-tech marketing that help the innovator, developer, and marketer better understand how high-tech markets work and how the most successful companies attack them. Topics include the technology adoption life cycle, discontinuous innovations, disruptive technologies, the "chasm" model of high-tech marketing, opportunity analysis, and go-to-market strategies. More than a course for marketers, this course will also better prepare innovators and developers to sell their ideas to their target audiences, whether they be end users, sources of research funding, or instrument companies. This is information that every person developing new technologies should know.

**Keywords**: New technology, marketing, business, finance, product development, entrepreneurship

**ST-16 Stable Isotopes for Metabolic Studies**, January 3, 8 am, Thomas Walczyk, Laboratory of Human Nutrition, Institute of Food Sciences, Swiss Federal Institute of Technology (ETH) Zürich, Seestrasse 72, CH-8803 Rüschlikon, Switzerland [thomas.walczyk@ilw.agrl.ethz.ch]

This course focuses on stable isotope techniques in mineral and trace element biomedical research. It is based on the need to harmonize and standardize methods and data evaluation techniques in metabolic studies using stable isotopes. The course includes an introduction to methodological principles, basic study designs and data evaluation techniques for the most common methods used in metabolic studies. It introduces the concepts of combined uncertainty budget for dose calculations and to avoid data over-interpretation, high quality stable isotope spikes, calculations for two or three stable isotope tracer systems based on isotope dilution principles and easy to use techniques to calculate combined uncertainties for complex methods.

**Keywords:** Stable isotopes, uncertainty budget, data evaluation, isotope spikes, ICP-MS

**ST-17 High Performance Sample Digestion Techniques for Trace Element Analysis**, January 5, 7 pm, Günter Knapp, Institute of Analytical Chemistry, Graz University of Technology, Technikerstrasse 4, A-8010 Graz, Austria [knapp@analytchem.tu-graz.ac.at]

Most sample decomposition techniques described in the literature are useful for trace element determination in common sample materials. But there are some elements or tough sample materials, which cannot be analyzed by means of these digestion methods. Examples for difficult elements are the halogens and for tough sample materials ceramics and the platinum metals Ir and Ru. Another difficult task is the decomposition of samples for element analysis in the ultra trace range. Within the main groups of sample decomposition techniques – fusion, combustion and wet digestion – those methods will be described and discussed, which enables to solve these analytical problems. Recently developed techniques like microwave assisted combustion, microwave boosted UV-digestion and pressurized high temperature wet digestion in open vessels will be just as discussed as methods, which are state of the art like oxygen bomb combustion, cool oxygen plasma ashing and microwave assisted wet digestion in closed pressurized vessels.

**Keywords:** sample digestion, ashing, combustion, wet digestion, ultra trace analysis

**ST-18 Elemental Speciation for Biological Samples**, January 3, 1 pm, Joseph A. Caruso, Department of Chemistry,

University of Cincinnati, P.O. Box 210037, Cincinnati, OH 45221-0037 [joseph.caruso@uc.edu], and Maria Montes-Bayón, Department of Chemistry, University of Oviedo, c/Julian Claveria 8, E-3006 Oviedo, Spain [mariamb1970@yahoo.com]

This course will describe sample treatment, separation and detection approaches to obtain speciation information from biological materials with plasma and other mass spectrometry techniques. Sample preparation with enzymatic digestions and the results for different enzymes and separations will be discussed. Various separation approaches including chiral types will be featured. Detection systems such as ICP-MS and other source types including some low power and low-pressure types, electrospray, and atmospheric pressure chemical ionization will be compared and the complementary nature of results described.

**Keywords:** Enzymatic digestions, ICP-MS, alternative detectors, separations, speciation, biological samples

**ST-19 U-Th-Pb Dating of Geological Sample by Laser Ablation ICP Mass Spectrometry**, January 3, 8 am, Jan Kosler, Department of Geochemistry, Charles University, CZ-12843 Prague, Czech Republic [kosler@natur.cuni.cz], and Mike Tubrett, Department of Earth Sciences, Memorial University of Newfoundland, St. John's, NL A1B 3X5, Canada [mike.tubrett@esd.mun.ca]

This course will describe the techniques used to obtain isotopic ages of U and Th bearing minerals. The topics covered will include optimization of the laser and ICP mass spectrometer for precise measurement of isotopic ratios, effects of laser wavelength and laser beam parameters on fractionation and signal stability, correction procedures for laser-induced fractionation of elements and instrument mass bias, and corrections for initial Pb present in the minerals. Also discussed will be pros and cons of isotopic ratio measurements in pulse counting and combined pulse counting/analogue modes. The techniques will be demonstrated using real data sets.

**Keywords:** Laser ablation ICP-MS, laser-induced fractionation, instrument mass bias, isotopic ratios, U-Th-Pb dating

**ST-20 Improving Laboratory Productivity and Data Quality**, January 2, 7 pm, Nimal De Silva, Department of Chemistry, Carleton University, Ottawa, ON K1S 5B6, Canada [ndesilva@ccs.carleton.ca]

Despite sophistication of the measurement systems currently available, signal drift, matrix effects, and many other factors, which may or may not be directly related to the performance of the instrument, and may or may not be identifiable, can cause analytical errors. Practical approaches to minimize such errors can be divided into two basic categories: *precautionary* measures and *corrective* measures. Commonly available spreadsheet software can be applied to automate such correction techniques to improve the data quality and productivity. Although the usage of spreadsheets are in common place, often their power is not exploited to the fullest potential. The two main objectives of this course are (1) to discuss with examples some practical strategies to improve the quality of analytical data, particularly applicable for automated analysis of large sample batches, and (2) to demonstrate efficient use of spreadsheets to automate such calculations. A basic background in spreadsheets is desirable but not essential.

**Keywords:** Data quality, productivity, analytical errors, accuracy, spreadsheets

**ST-21 Solid Phase Microextraction as a Tool for Trace Element Speciation**, January 2, 1 pm, Zoltan Mester and Ralph Sturgeon, National Research Council of Canada, 1500 Montreal Rd., Ottawa, ON K1A 0R6, Canada [zoltan.mester@nrc.ca, ralph.sturgeon@nrc.ca, http://www.ems.nrc.ca]

The course will provide an overview of solid phase microextraction (SPME) operation and describe typical SPME applications to elemental speciation. A detailed method development guide will be presented. Most SPME applications focus on tin, mercury, and lead speciation by derivatization and GC separation. Direct coupling of SPME to ICP-MS for the determination of volatile elements will be described. Other microextraction approaches including membrane- and single droplet extraction will be included. Participants who complete this course should be well equipped to use SPME metal speciation.

**Keywords:** Solid phase microextraction, SPME, speciation, mercury, lead, tin, ICP, sample preparation

**Zoltan Mester** is a Research Officer of the Institute for National Measurement Standards, National Research Council of Canada (NRC), where since 1999 he has been leading speciation-related research. He received his PhD in 1998 in Budapest, Hungary, and he worked with Professsor J. Pawliszyn, the inventor of SPME, at the University of Waterloo, developing inorganic analytical applications for SPME. He has published 30 papers on SPME.

**Ralph Sturgeon** received his PhD in analytical chemistry in 1977 under the guidance of Professor C.L. Chakrabarti. For the past 25 years he has been employed in Ottawa at the National Research Council of Canada, where he is currently a Principal Research Officer and Group Leader for Chemical Metrology within the Institute for National Measurement Standards. His research interests include trace element analysis and organometallic speciation with emphasis on atomic and mass spectrometric detection. He has published approximately 190 papers in these areas. He serves on the advisory board of a number of analytical journals and is an editor for *Spectrochimical Acta Reviews*.

**ST-22 Achieving Reliable Trace Elemental Measurements**, January 2, 8 am, Paul R. Gaines, Inorganic Ventures, 195 Lehigh Ave., Suite 4, Lakewood, NJ 08701, [ivtech@ivstandards.com]

More than ever before, people are making decisions based on chemical measurements that affect us medically, environmentally, legally, and commercially. The reliability of these measurements is becoming a critical matter. This course presents an essential guide for trace analysts at any level of experience. Topics cover all phases of sample collection, preparation, measurement, and data analysis. All references to trace analysis assume the use of either ICP-OES or ICP-MS for the purposes of this course.

**Keywords:** Trace analysis, planning, sampling, plasma spectrometry

**ST-23 Expert Witness Practices for Scientists**, January 2, 8 am, Henry Nowicki [hnpacs@aol.com], PACS Inc., 409 Meade Dr., Corapolis, PA 15108

This course provides an appreciation of the role and liabilities of providing expert witness services. Participants will be given a realistic overview of the course of legal cases, when and when not to take cases, and how to state opinions and conclusions in a defensible manner. Topics include introduction to expert witness reports, qualifications of the expert, discoverability of expert reports, legal requirements, fomating, properly disclosing documents reviewed, and stating the expert's qualifications accurately and objectively.

**Keywords:** Expert witness, working with counsel, legal requirements, report preparation

**ST-24 Speciated Isotope Dilution Mass Spectrometry for Species Sample Preparation and Analysis**, January 4, 1 pm, H.M. Skip Kingston, Duquesne University, Department of Chemistry and Center for Environmental Research and Education. Pittsburgh PA, 15282 [Kingston@duq.edu]

Elemental speciation is one of the most challenging analytical measurements. Some elemental species undergo conversion or degradation. To make matters worse, a lack of both standards and diagnostic tools has inhibited progress of the field. Knowing the transformation of the species is critical in the development and validation of methods and for the certification of standard reference materials. Speciated isotope dilution mass spectrometry (SIDMS) addresses the correction for degradation or conversions of the analyte species during sampling, storage, sample preparation and measurement steps. SIDMS has been developed and successfully applied to difficult measurement needs of elemental speciation analysis. By spiking the sample at each step with enriched stable isotopes of the same species, SIDMS can be used as a diagnostic tool to identify the steps at which the species are altered. SIDMS has the potential to be used as a diagnostic tool to validate other methods and to certify speciated standards. The SIDMS method has been adopted by the US EPA as Method 6800 and has been validated or is under validation for different species. The unique sample preparation requirements of species in samples will be described, and the SIDMS method will be presented with practical examples and demonstrations of real measurements.

**Keywords:** Speciation, Reagents, Standards, Sample Preparation, Mass Spectrometry, Isotopes

## Workshop on New Plasma Instrumentation

**WS-01-03 Workshop on New Plasma Instrumentation**, January 6-8, 3:15 to 5:15 pm, Isaac (Joe) Brenner, 9 Dishon Street, Apartment 9, Malkha, Jerusalem 96956, Israel [brenner@cc.huji.ac.il], and Robert I. Botto, ExxonMobil Chemical Co., 4500 Bayway Dr., Baytown, TX 77520 [bob.i.botto@exxonmobil.com]

A workshop featuring current plasma instrumentation will be presented during three afternoons to highlight the latest commercial plasma instrumentation and related products. The workshop will be divided into three main sections: (Tuesday) plasma source (ICP) atomic emission spectroscopy, (Wednesday) plasma source (ICP) mass spectrometry, and (Thursday) plasma accessories (*e.g.*, chromatograph interface, electrothermal vaporizer, laser and spark ablation, special nebulizers, preconcentration and sample introduction equipment, special adapter kits) and sample preparation. Representatives from major plasma companies and/or exhibitors will present brief technical descriptions and discussions of their new product developments and design philosophy. Each company will provide product literature, application notes, and presentation summaries. Participants will be encouraged to question representatives. The afternoon program is planned to parallel the exhibition and poster sessions. There is no charge to attend the workshop.

**Keywords:** New instrumentation, product description, ICP-AES, ICP-MS, accessories

## Manufacturers' Seminars

**MS-01 Arsenic, Mercury, and Selenium Speciation with Atomic Fluorescence Spectroscopy, Part I: Theory, Instrumentation and Applications**, January 4, 8 am**; Part 2: Laboratory Experiments and Demonstration**, January 4, 12:30 pm, Yong Cai, Department of Chemistry, Florida International University, Warren Corns and Derek Bryce, PS Analytical, 1761 W. Hillsboro Blvd., Suite 318, Deerfield Beach, FL 33442 [usa@psanaltyical.com pms@psanalytical.com]

This seminar will introduce atomic fluorescence spectrometry (AFS) as an extremely sensitive technique for the speciation of Hg, As, and Se. Atomic fluorescence coupled to vapor and hydride generation has been used extensively over the last decade to provide extremely low detection limits and accurate measurements for a wide range of sample matrices. More recently AFS has been coupled to both GC and HPLC to offer an economic approach to elemental speciation. In Part 1 of the seminar, the theory, instrumental design and coupling of separation techniques will be discussed in detail. The presenters will focus on the importance of sample preparation and will give specific examples of selective extractions used for the speciation of As, Hg, and Se. Keynote invited speakers working in this field will share their experiences for a wide range of applications. Part 2 of the seminar is an optional practical session organized by Florida International University (FIU). Participants will get the opportunity to receive hands on experience with capillary GC-AFS for Hg speciation and HPLC-hydride generation-AFS for the speciation of arsenic and selenium. Lunch and transportation to/from FIU provided.

**Keywords:** Speciation, arsenic, selenium, mercury, atomic fluorescence spectrometry, sample preparation

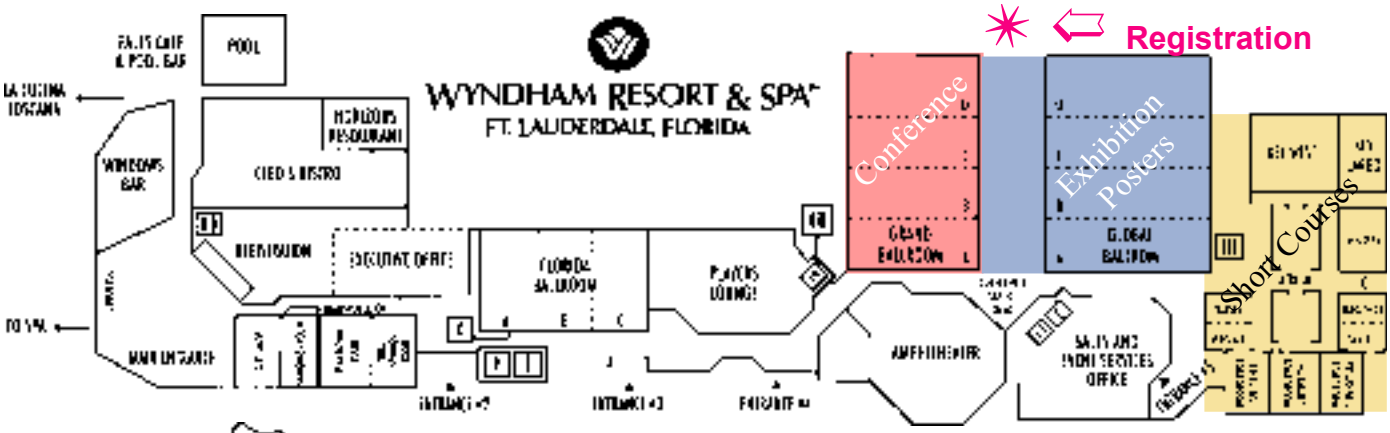
**Yong Cai** graduated in 1982 with a BSc in Marine Chemistry from Ocean University of Qingdao, China. In 1989 he received a PhD in Environmental Chemistry from Nankai University, China. He is currently associate professor in the Department of Chemistry at Florida International University. His research interests are in the field of environmental and bioanalytical chemistry of trace metals and organometallic compounds, which include the development of new analytical techniques for speciation of metals and metalloids, and their fate and transport in the environmental and biological systems.

**Warren Corns** graduated in 1988 with a BSc in Marine Chemistry from Bangor University. In 1991 he was received a PhD from the University of Plymouth on novel approaches to automated analytical instrumentation. Since then he has been R & D Manager at PSA .During this time he has developed numerous analytical systems for laboratory and process analyzers based on atomic fluorescence spectrometry. Dr. Corns has published over 50 technical publications, and his research efforts were recognized in 1996 when he was awarded the Hilger Spectroscopy Prize.

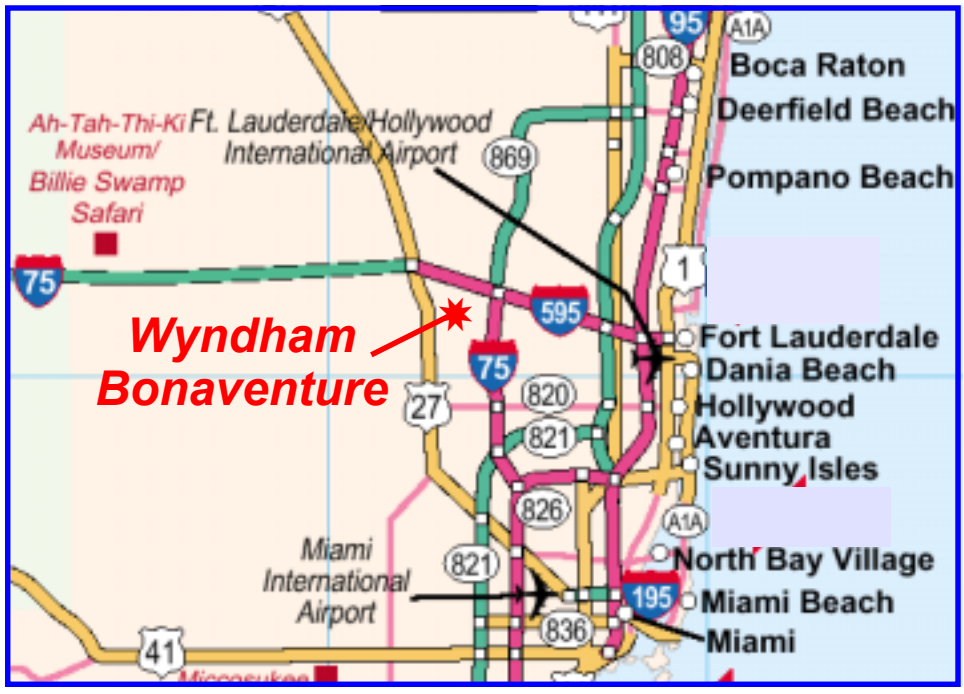
**Derek Bryce** graduated in 1991 with a BSc degree in Chemistry from Glasgow University. He then studied the development of automated methods for the speciation of Se and Hg for a PhD at the University of Cordoba in Spain. Derek is currently the application specialist for PSA during which time he has been fundamental in applying AFS for speciation measurements.

Seminar abstracts and schedules to be announced.

# Wyndham Bonaventure Resort & Spa



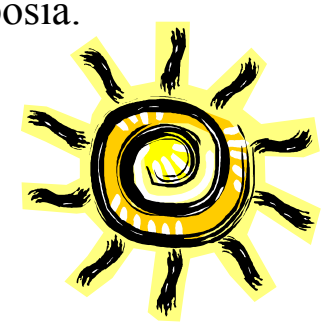




# 2004 Winter Conference on Plasma Spectrochemistry

## Fort Lauderdale, Florida, January 5 – 10, 2004

The 13th biennial international Winter Conference will be held at the Wyndham Bonaventure Resort and Spa (www.wyndham.com/bonaventure) in Fort Lauderdale, Florida (www.sunny.org). More than 600 scientists are expected, and over 300 papers on modern plasma spectrochemistry will be presented. Six plenary lectures and 22 invited speakers will highlight critical topics in 12 symposia.



### Symposium Features

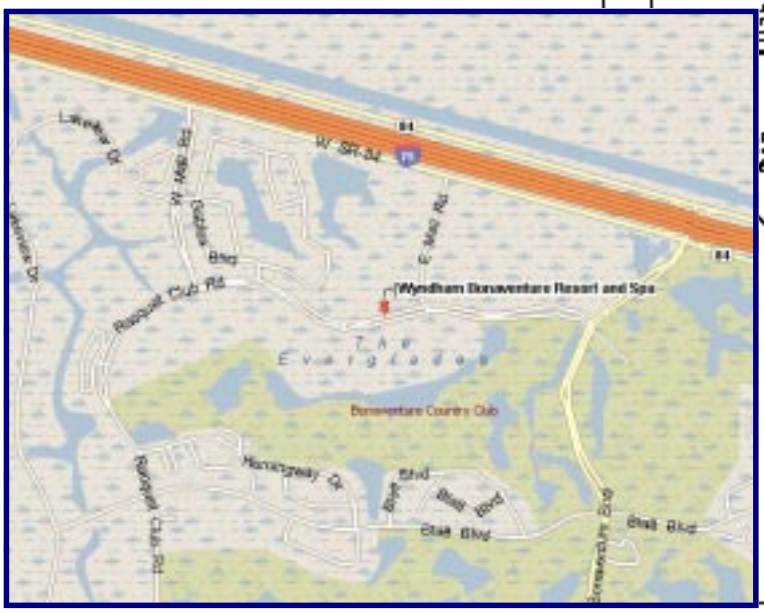
- Elemental speciation and sample preparation
- Excitation mechanisms and plasma phenomena
- Flow injection and flow processing spectrochemical analysis
- Glow discharge atomic and mass spectrometry
- Inductively coupled plasma atomic and mass spectrometry
- Laser ablation and breakdown spectrometry
- Microwave atomic and mass spectrometry
- Plasma chromatographic detectors
- Plasma instrumentation, microplasmas, automation, and software innovations
- Sample introduction and transport phenomena
- Sample preparation, treatment, and automation; high-purity materials
- Spectrochemical chemometrics, expert systems, and software
- Spectroscopic standards and reference materials, databases
- Stable isotope analyses and applications

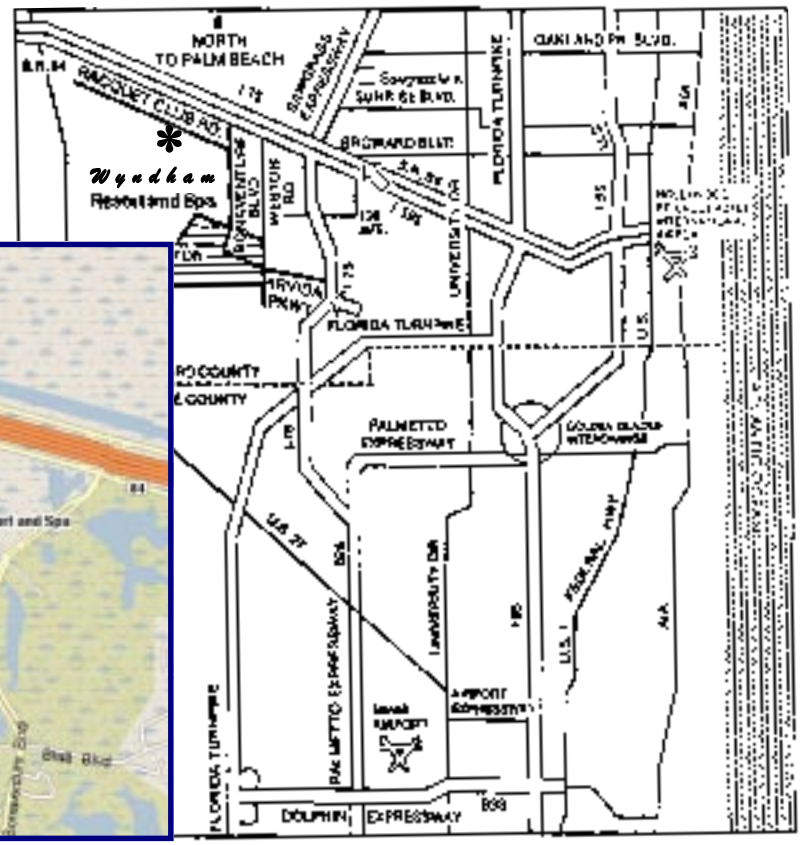
### Also

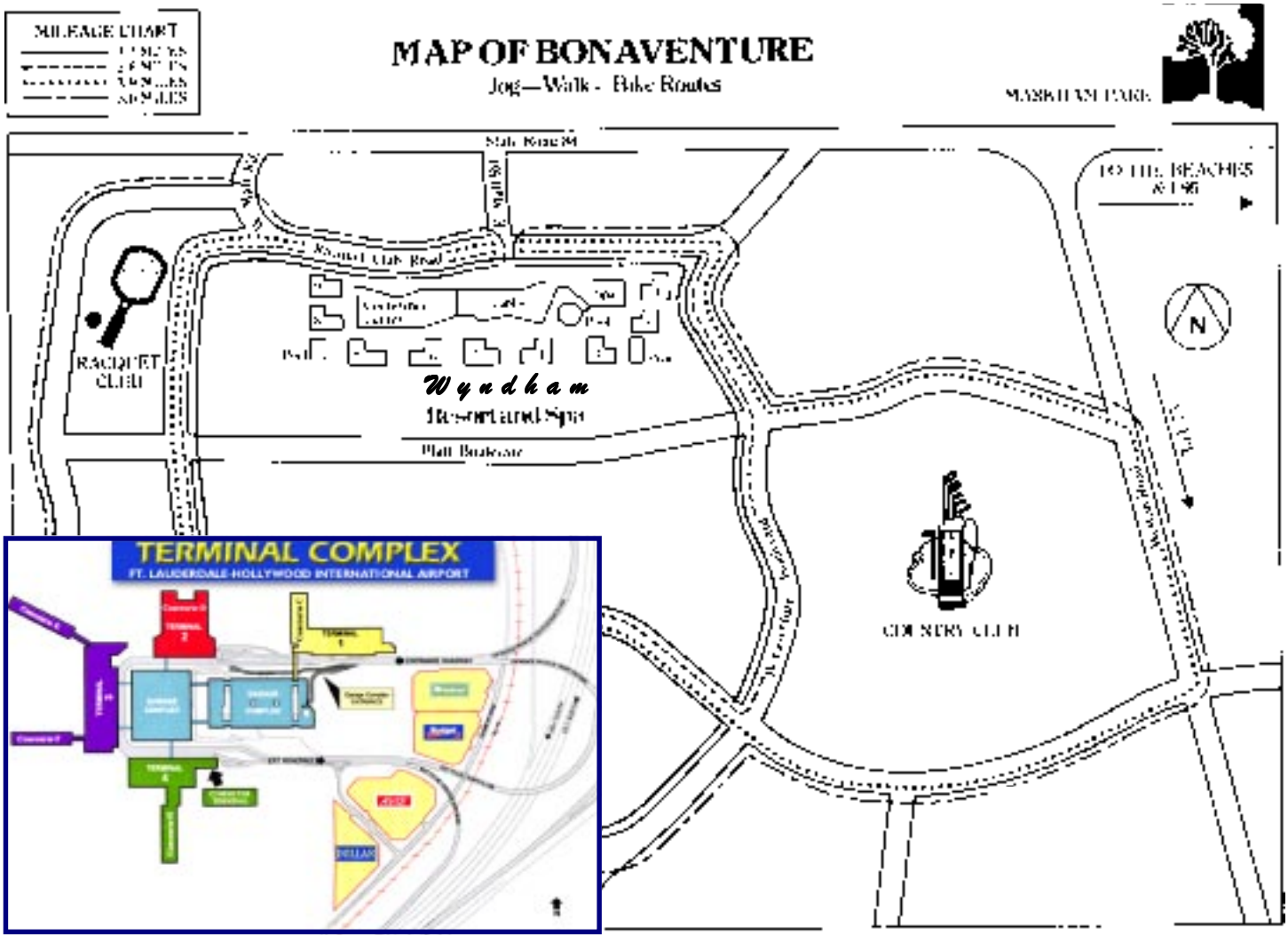
- Sixty-two Continuing Education Short Courses, Friday - Sunday, January 2 - 4
- Manufacturer's Seminars, Friday - Sunday, January 2 - 4
- 5th Annual Golf Tournament, Sunday, January 4
- Plasma Spectroscopy Instrumentation Exhibition, Tuesday - Thursday, January 6 - 8
- Six Provocative Panel Discussions, Daily
- Workshop on New Plasma Instrumentation, Tuesday-Thursday, January 6 - 8

### Information

For program, registration, hotel, and transportation details,visit the Conference website at http://www-unix.oit.umass.edu/~wc2004, or contact Ramon Barnes, ICP Information Newsletter, Inc., P.O. Box 666, Hadley, MA 01003-0666, telephone: 413-256-8942, fax 413-256-3746, e-mail wc2004@chemistry.umass.edu.


Wyndham Bonaventure Resort and Spa
Bonaventure Country Club


NORTH
TO PALM BEACH
RACQUET CLUB RD
Wyndham
Resort and Spa
BROWARD BLVD
FLORIDA TURNPIKE
PALMETTO EXPRESSWAY
DOLPHIN EXPRESSWAY


MILEAGE CHART
MAP OF BONAVENTURE
Jog—Walk - Bike Routes
MARRIOTT PARK
RACQUET CLUB
Wyndham
Resort and Spa
Main Entrance
COUNTRY CLUB
N


TERMINAL COMPLEX
FT. LAUDERDALE-HOLLYWOOD INTERNATIONAL AIRPORT

# 2004 Winter Conference on Plasma Spectrochemistry

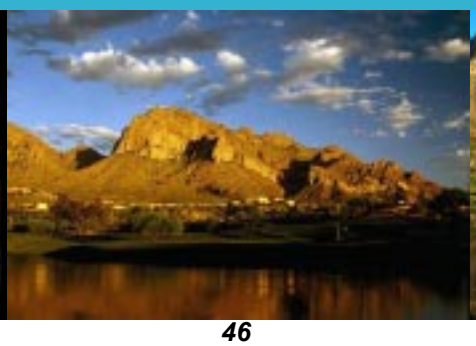
*January 4 – 10, 2004, Fort Lauderdale, Florida*

**http://www-unix.oit.umass.edu/~wc2004/WinterConf2004.htm**

# 2006 Winter Conference on Plasma Spectrochemistry

*January 8– 14, 2006, Tucson, Arizona*

**http://www.hiltonelconquistador.com, http://www.visitTucson.org**



# *University Research Institute for Analytical Chemistry*

*85 North Whitney Street*
*Amherst, Massachusetts 01002-1869*

*Solving Tomorrow's Problems Today*
- *Quality*
- *Service*
- *Innovation*

## *Research Laboratories for*

- *Biological, environmental and physical modeling and simulations*
- *Chemical speciation*
- *Chemical statistics (chemometrics)*
- *Commercial, industrial, and government contracts*
- *Environmental forensics*
- *Instrument evaluation and development*
- *Method development and testing for agriculture, biology, biomedicine, advanced materials, environmental chemistry, and semiconductor industries*
- *Problem solving*
- *Project management*
- *Research and development grants*
- *Source and country of origin identification*
- *Ultra-trace elemental analysis*

## *Ultra-Clean and Secure Laboratories for*

- *Dedicated space for industrial and commercial clients*
- *Equipment demonstrations and advanced training*
- *New equipment evaluation and testing*
- *New technology development*
- *On-site experienced chemists to assist clients*
- *Proprietary instrumentation development*

## *High-Quality Sample Analysis*

- *Industry*
- *Commerce*
- *Environment*
- *Government*
- *University and Research Institutions*
- *Agriculture, Medicine and Nutrition*
- *Semiconductors*

## *URIAC Features*

- *Advanced problem solving*
- *Project management*
- *Exceptional quality analysis*
- *First-class customer service*
- *Professional research and development*
- *State-of-the-art instrumentation*
- *Ultra-clean, metal-free analysis facility*

*The University Research Institute for Analytical Chemistry, the research and laboratory division of ICP Information Newsletter, Inc., located in Amherst near the University of Massachusetts, provides chemical research, analysis, testing, and training and is the home of analytical experts performing non-routine, specialty chemical analyses for academic laboratories, industry, and government agencies.*

*For information contact ICP Information Newsletter, Inc., P.O. Box 666, Hadley, MA 01035-0666 USA. Telephone (413) 256-8942, fax (413) 256-3746, e-mail icpnews@chem.umass.edu.*

# *ICP Information NEWSLETTER, Inc.*
# *Grant Program*

ICP Information Newsletter, Inc., publisher of the *ICP Information Newsletter* and sponsor of the Winter Conference on Plasma Spectrochemistry, is a tax-exempt (section 501(c)(3) of the Internal Revenue Code of 1954), philanthropic organization incorporated in the Commonwealth of Massachusetts. As a publicly supported organization, its purpose is to promote, foster, advance, and improve the study, research, teaching and dissemination of knowledge regarding plasma spectrochemistry, analytical chemistry, science education, and related areas. The Corporation's charitable, educational, and scientific purposes are achieved, in part, by contributions. The Corporation has established the following five grant programs for 2003. These five grant programs are supported by fund raising and individual and corporate sponsors. Tax-deductible contributions are used to establish and maintain these grant programs in 2003 and for the 2004 Winter Conference on Plasma Spectrochemistry.

**1. Conference Travel Grants**

A Student Travel Scholarship and International Scientist Fellowship program is to provide opportunities for students and professionals to travel to scientific conferences (*e.g.*, the 2004 Winter Conference on Plasma Spectrochemistry) to present papers describing their plasma spectrochemistry research. Grants will generally range from $100 for undergraduate students to $3000 for international scientists.

**2. Conference Registration Grants**

A Student Conference Registration Scholarship and International Scientist Conference Registration Fellowship program is to furnish an opportunity for students and professionals to participate in a scientific conference (*e.g.*, the 2004 Winter Conference on Plasma Spectrochemistry) to present papers describing their plasma spectrochemistry research. Awards will generally range from $50 for students to $1500 for international scientists.

**3. Newsletter Subscription Grants**

An annual subscription to the *ICP Information Newsletter* will be awarded to students and professional analytical chemists presently or planning to work in the field of plasma spectrochemical analysis.

**4. Training Grants**

Training grants for students and professional analytical chemists will be provided to enhance their experience and background in the field of plasma spectrochemistry. Awards will be made to attend short courses (*e.g.*, at the 2004 Winter Conference on Plasma Spectrochemistry) or practical laboratory training in qualified research facilities.

**5. Research Grants**

Research grants for students and professional analytical chemists will be provided to undertake advanced research and development in plasma spectrochemistry.

# *Corporate Affiliates and Patrons Program*

The ICP Information Newsletter is grateful for the continued and growing support of its corporate sponsors, subscribers, conference participants, and professional colleagues during the past 30 years. With the introduction of our new research and development laboratory division, we wish to explore some of the charitable giving opportunities we offer our sponsors. Organizations and individuals interested in supporting the advance and development of basic and applied research and development in plasma spectrochemistry, chemical education, and analytical chemistry are invited to take part in our Corporate Participation Program as Corporate Affiliates and Patrons. Charitable gifts to the ICP Information Newsletter, Inc. are tax-deductible in accordance with Section 170 of the Internal Revenue Code.

**Corporate Affiliates** assist the ICP Information Newsletter through their financial contributions in several ways. Primarily these contributions are used to fund award programs for students, travel assistance, and conference attendance. Contributions of equipment, supplies, technical support and facilities by corporate affiliates extend our training and research grants. Corporate sponsors also can support our New Laboratory Building Fund, which provides construction and outfitting of our new Corporate R&D and service laboratories and offices.

*Corporate Affiliate's Benefits and Opportunities*

- Your corporation name included in the listing of all active Corporate Affiliates in the Annual Financial Report and monthly *ICP Information Newsletter*.
- Advertising discount in ICP Information Newsletter publications
- Analysis discount at University Research Institute for Analytical Chemistry
- Conference show discount at Winter Conference exhibitions
- Corporate profile on our Website
- Recognition of support in *ICP Information Newsletter* and in Winter Conference promotional material
- Registration discount at Winter Conference meetings and URAIC training programs
- Rental discount of mailing lists
- Subscription discount to *ICP Information Newsletter*

**Patron Sponsorship** serves individual contributors who desire the highest level of involvement with the activities of the ICP Information Newsletter, Inc. Patron sponsors underscore your support for the causes of spectroanalytical chemistry worldwide including our conference travel and registration grants, our Newsletter subscription grants, and our Training and Research Grants. Patron sponsors also can support our New Laboratory Building Fund. Sponsorship includes exclusive privileges and benefits.

*Patron Benefits*

- Your name included in the listing of all active Patrons in the Annual Financial Report and monthly *ICP Information Newsletter*.
- Analysis discount at University Research Institute for Analytical Chemistry
- Registration discount at biennial Winter Conference meetings
- Subscription discount to *ICP Information Newsletter*

**Other giving opportunities** are available and include awards and gifts. If these ideas are of interest, we recommend that you discuss these plans and options with your attorney or financial advisor.

***Awards***

Contributors may wish to establish new awards honoring the achievements of noted individuals in the field of spectroanalytical chemistry or endow prizes for existing awards.

***Memorial Gifts***

Members of the analytical chemistry community or their families may make contributions to the Corporation in memory of loved ones. Memorial gifts are listed annually in *ICP Information Newsletter*.

***Future Giving***

*Bequests* – You may bequeath a specific amount or percentage of money to ICP Information Newsletter, Inc. in your will. Including the Corporation in your will is a straightforward way of providing for the long-term future of the spectrochemical community. Bequests, both large and small are welcome.

*Life Insurance and IRA/Keogh Plans* – You may designate ICP Information Newsletter as the beneficiary of existing life insurance policies or purchase a policy specifically to benefit the Corporation. You may also designate ICP Information Newsletter as the beneficiary of and IRA or Keogh plans.

**ICP Information Newsletter, Inc.**

I wish to become a ___ Corporate Affiliate or ___ Corporate Patron.

Enclosed please find my annual tax-deductible contribution to ICP Information Newsletter, Inc. in the amount of $ .

I wish to designate this contribution to support

❏ Building Fund, ❏ Conference Registration Grant, ❏ Conference Travel Grant, ❏ Newsletter Subscription Grant,
❏ Research Grant, ❏ Winter Conference Symposia Fund, ❏ Training Grant, ❏ Unrestricted Research Fund

*Double Your Gift!* Many companies match employee contributions. Please obtain a matching gift form from your personnel office and enclose it with your contribution.

__ I have included or intend to include ICP Information Newsletter, Inc. as a beneficiary of my will, insurance policy.

__ I am interested in discussing other deferred giving options. Please call me at _____

Please provide your name, address, occupation/employer, telephone/fax/e-mail:

Forward your contribution or pledge to ICP Information Newsletter, Inc., PO Box 666, Hadley, MA 01035-0666 USA.

# ICP Information NEWSLETTER

**Ramon M. Barnes, Editor**
**ICP Information Newsletter, Inc.**
**P.O. Box 666**
**Hadley, MA 01035-0666**
**Telephone (413) 256-8942, fax 256-3746**

## Objective

The *ICP Information NEWSLETTER* is a monthly journal published by the ICP Information Newsletter, Inc., a nonprofit organization, and is devoted exclusively to the rapid and impartial dissemination of news and literature information related to the development and applications of plasma sources for spectrochemical analysis.

## Background

**ICP** stands for **inductively coupled plasma** discharge, which during the past 30 years has become the leading spectrochemical excitation source for atomic emission spectroscopy and ion source for inorganic mass spectrometry. The popularity of this source and the need to collect in a single literature reference all of the pertinent data on ICP stimulated the publication of the *ICP Information NEWSLETTER* in 1975. Other plasma sources, such as microwave induced plasmas, direct current plasma jets, and glow discharges, have grown in popularity and are also included in the scope of the *ICP Information NEWSLETTER*.

## Scope

As the only authoritative monthly journal of its type, the *ICP Information NEWSLETTER* is read in more than 40 countries by scientists actively applying or planning to use the ICP or other types of plasma spectroscopy. For the novice in the field, the *ICP Information NEWSLETTER* provides a concise and systematic source of information and background material needed for the selection of instrumentation or the development of new methodology. For the experienced scientist, it offers a single-source reference to current developments and literature.

*http://www-unix.oit.umass.edu/~wc2004*

## Editorial

The *ICP Information NEWSLETTER* is edited by Dr. Ramon M. Barnes, Professor Emeritus of Chemistry, University of Massachusetts at Amherst, with the assistance of a 17-member Board of National Correspondents composed of leading plasma spectroscopists. The international Board members report news, viewpoints, and developments. Dr. Barnes has been conducting plasma research on ICP and other discharges since 1968. He also serves as chairman of the Winter Conference on Plasma Spectrochemistry, also sponsored by ICP Information Newsletter, Inc.

## Regular Features

- Original submitted and invited research articles by ICP and plasma experts.
- Complete bibliography of all major ICP publications.
- Abstracts of all ICP papers presented at major US and international meetings.
- First-hand accounts of world-wide ICP developments.
- Special reports on dcp, microwave, glow discharge and other plasmas.
- Calendar and advanced programs of plasma meetings.
- Technical translations and reprints of critical foreign-language ICP papers.
- Critical reviews of plasma-related books and software.

## Conference Activities

The *ICP Information NEWSLETTER* has sponsored 12 international meetings on developments in atomic plasma spectrochemical analysis since 1980 in San Juan, Orlando, San Diego, St. Petersburg, Fort Lauderdale, Kailua-Kona, and Scottsdale. Meeting proceedings have appeared in special issues of *Spectrochimica Acta, Part B, Analytical and Bioanalytical Chemistry*, and *Journal of Analytical Atomic Spectrometry*. The 2004 Winter Conference will be held in Fort Lauderdale, Florida, on January 4 - 10, 2004. Contact winterconf@chem.umass.edu for details.

## Subscription Information

Subscriptions are available for 12 issues on either an annual or volume basis. The first issue of each volume begins in June and the last issue is published in May. Volume 29 includes June 2003 through May 2004. Back issues beginning with Volume 1, May 1975, also are available. Published in digital format since November 2002, rates are $67 (US/Canada), $92 overseas, except Africa, Asia, and Pacifica $102. Submit order with prepayment or purchase information. For additional information please call (413) 256-8942, fax (413) 256-3746, internet icpnews@chem.umass.edu, or contact the Editor rmbarnes@chem.umass.edu. Major credit cards are accepted. Advertising information is available on request. *ISSN 0161-6951*