

IN THIS ISSUE...

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In this issue...

This issue showcases the research presented at the 2005 European Winter Conference on Plasma Spectrochemistry



Chemical biology articles published in this journal also appear in the *Chemical Biology Virtual Journal*: www.rsc.org/chembiol



Cover

Illustration shows an SEM image of an ablation crater in brass. Image created by Ralph Kaegi (EMPA, Dübendorf) and reproduced by permission of D. Günther from *J. Anal. At. Spectrom.*, 2005, **20**(9), 894.

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C65

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Chemical Science

September 2005/Volume 2/Issue 9

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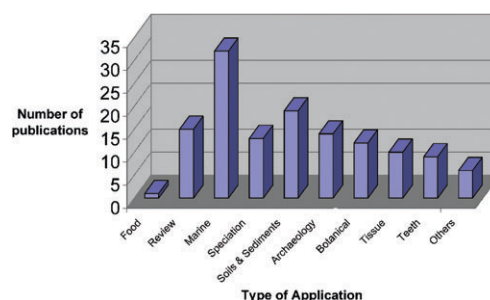
REVIEW ARTICLE

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Recent biological and environmental applications of laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS)

Steven F. Durrant* and Neil I. Ward

Recent trends and innovations in biological and environmental applications of LA-ICP-MS are reviewed. Analytical performance and difficulties with matrices such as fish otoliths, feathers, soil, and wood are discussed. Speciation using LA-ICP-MS is evaluated and future developments are anticipated.



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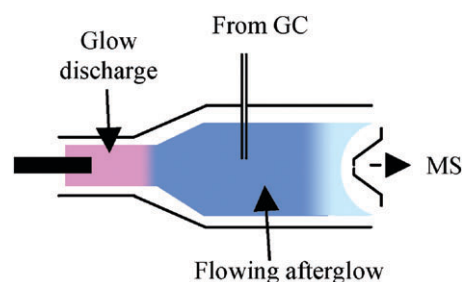
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Organotin speciation using fast flow glow discharge mass spectrometry

Karla Newman and Rod S. Mason*

The technique couples multi-element capabilities and sub-picogram detection limits with instrumental and operational simplicity. Ionisation (and fragmentation) pathways appear to originate from excited state chemistry.

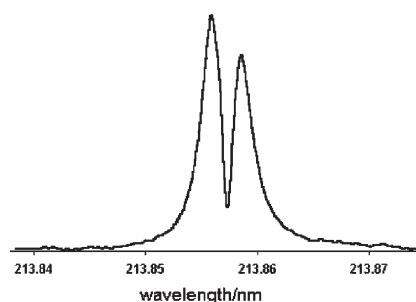


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Excitation of zinc in a Grimm-type glow discharge: effects of hydrogen and other excitation-related matrix effects

Zdeněk Weiss,* Edward B. M. Steers and Petr Šmíd

The excitation of Zn in the Grimm-type Ar glow discharge was studied using CCD and FTS spectrometry. The effects of the presence of hydrogen were investigated.

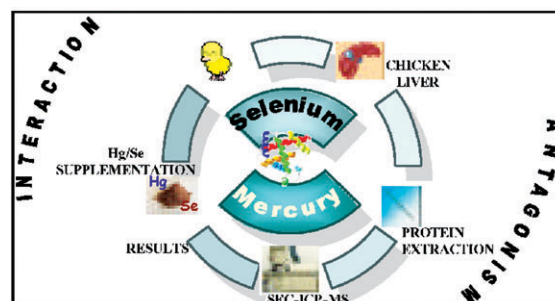


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Study of mercury–selenium interaction in chicken liver by size exclusion chromatography inductively coupled plasma mass spectrometry

Ana I. Cabañero, Yolanda Madrid and Carmen Cámara*

Thorough investigation of metal species interactions (Hg, Se and other elements) in an animal model for proving the metal incorporation into proteins.

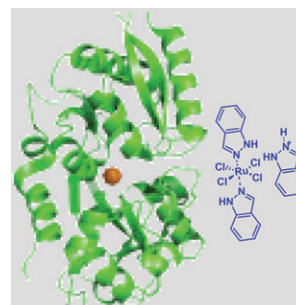


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Two dimensional separation schemes for investigation of the interaction of an anticancer ruthenium(III) compound with plasma proteins

M. Sulyok, S. Hann, C. G. Hartinger, B. K. Keppler, G. Stingeder and G. Koellensperger*

The interaction of a novel metallodrug (indazolium *trans*-[tetrachlorobis(1*H*-indazole)ruthenate(III)]) with transporter proteins was studied by implementation of 2-dimensional separation schemes.

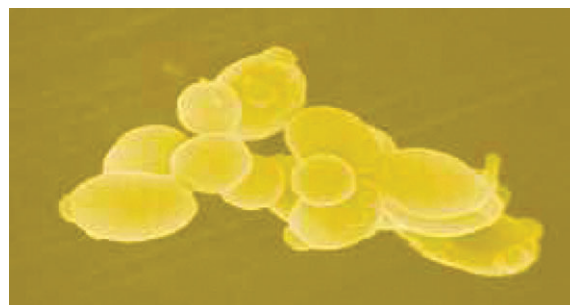


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Identification of water-soluble gamma-glutamyl-Se-methylselenocysteine in yeast-based selenium supplements by reversed-phase HPLC with ICP-MS and electrospray tandem MS detection

Heidi Goenaga Infante,* Gavin O'Connor, Margaret Rayman, Raimund Wahlen, Jullian E. Spallholz, Ruth Hearn and Tim Catterick

This is the first report on the characterisation of gamma-glutamyl-Se-methylselenocysteine in Se–yeast aqueous extracts. This was achieved using reversed-phase HPLC with on-line ICP-MS and electrospray MS/MS without a need for sample cleanup/preconcentration.



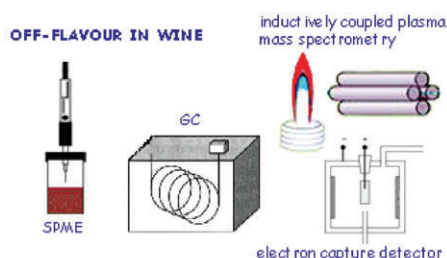
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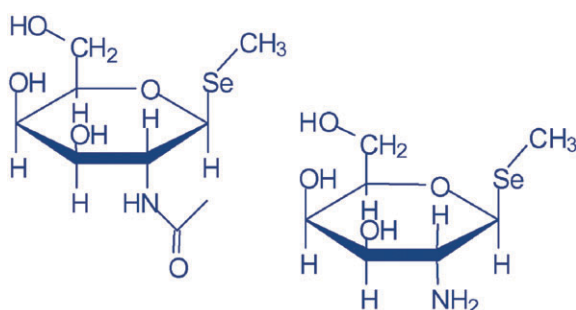
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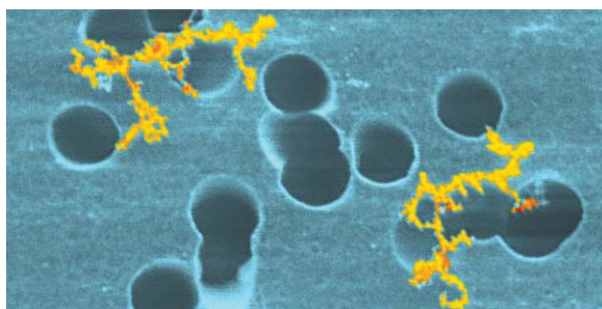
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Determination of hexavalent chromium in cement by the use of HPLC-ICP-MS, FPLC-ETAAS, spectrophotometry and selective extraction techniques

Janez Ščančar,* Radmila Milačič, Fabienne Séby and Olivier F. X. Donard

The potential for reliable determination of water-soluble Cr(VI) in cement was estimated by applying HPLC-ICP-MS, FPLC-ETAAS, spectrophotometry and selective extraction procedures.

Determination of organophosphorus pesticides in spiked river water samples using solid phase microextraction coupled to gas chromatography with EI-MS and ICP-MS detection

Natalia Fidalgo-Used, Maria Montes-Bayón, Elisa Blanco-González and Alfredo Sanz-Medel*

This paper describes the analysis by SPME-GC-MS and SPME-GC-ICP-MS of organophosphorus pesticides in river water samples due to their broad use for crop protection in agricultural areas.

Optimisation of a two-dimensional on-line coupling for the determination of anisoles in wine using ECD and ICP-MS after SPME-GC separation

J. L. Gómez-Ariza,* T. García-Barrera and F. Lorenzo

Haloanisoles responsible for musty-mouldy off-odour in wines have been determined by means of headspace solid-phase microextraction, gas chromatographic separation and a two-dimensional detection system based on in-series coupling of an electron capture detector to an inductively coupled plasma mass spectrometer (ICP-MS).

Quantitative determination of selenium metabolites in human urine by LC-DRC-ICP-MS

Bente Gammelgaard,* Lars Bendahl, Naja Wessel Jacobsen and Stefan Stürup

A method for quantitative determination of the main metabolites of selenium in human urine—the selenosugars *Se*-methylseleno-*N*-acetylgalactosamine and *Se*-methylselenogalactosamine—is described.

Evaluation of different techniques for particle size distribution measurements on laser-generated aerosols

Hans-Rudolf Kuhn,* Joachim Koch, Roland Hergenröder, Kay Niemax, Markus Kalberer and Detlef Günther*

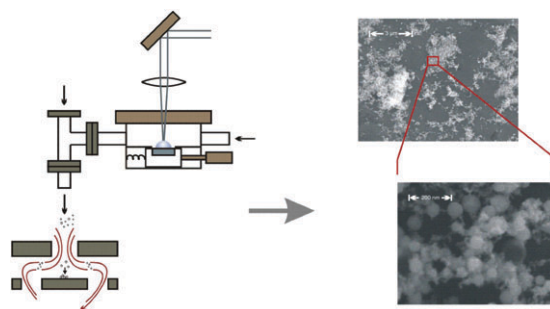
This work shows the characteristics of particle impaction, optical particle counting (OPC) and differential mobility analysis (DMA) for particle sizing of laser-generated brass aerosols. Attention is drawn to size classification of agglomerates by the techniques.

901

Elemental fractionation of dielectric aerosols produced by near-infrared femtosecond laser ablation of silicate glasses

J. Koch,* H. Lindner, A. von Bohlen, R. Hergenröder and K. Niemax

The fractionation properties of dielectric aerosols produced by femtosecond laser ablation of silicate glasses have been examined using low-pressure impaction and TXRF analysis.

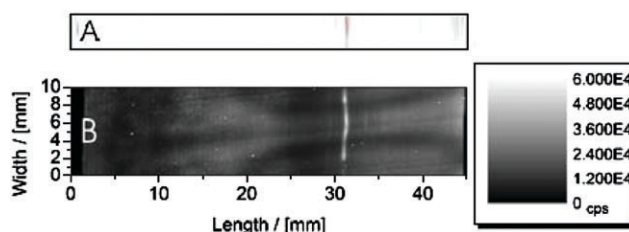


907

Detection of specific proteins by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) using gold cluster labelled antibodies

Sebastian D. Müller,* Roland A. Diaz-Bone, Joachim Felix and Wolfgang Goedecke

LA-ICP-MS has been applied to the determination of protein-bound gold using Western-blotting. The ablation technique is used to detect proteins by means of antibodies conjugated to gold clusters.

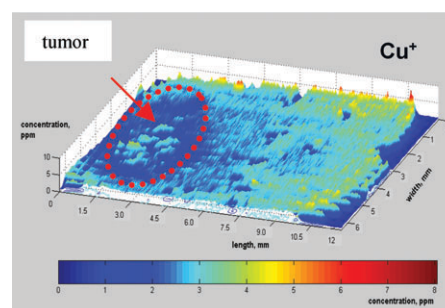


912

Copper, zinc, phosphorus and sulfur distribution in thin section of rat brain tissues measured by laser ablation inductively coupled plasma mass spectrometry: possibility for small-size tumor analysis

J. Sabine Becker,* Miroslav V. Zoriy, Markus Dehnhardt, Carola Pickhardt and Karl Zilles

Quantitative Cu, Zn, P and S distribution in a rat brain section containing a local tumor in comparison with control brain tissue were measured by LA-ICP-MS using a cooled laser ablation chamber.

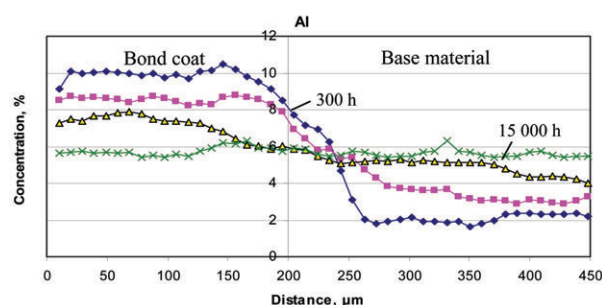


918

LA-ICP-MS studies of cross section of NiCrAlY-based coatings on high-temperature alloys

Andrei V. Izmer, Myroslav V. Zoriy, Carola Pickhardt, Willem Quadackers, Vladimir Shemet, Lorenz Singheiser and J. Sabine Becker*

LA-ICP-MS as a microlocal analytical technique was used to study the lateral element distribution on NiCrAlY-based alloy and coating after oxidation in air (300, 1000, 5000, 15 000 hours) at 980 °C.

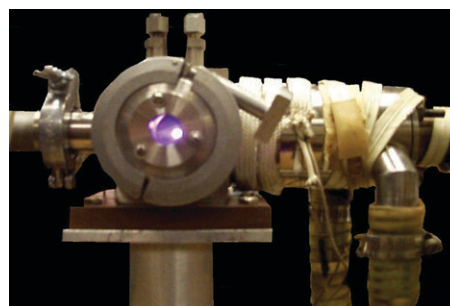


924

Determination of phosphorus and carbon in phosphorylated deoxynucleotides via particle beam/hollow cathode glow discharge optical emission spectroscopy (PB/HC-OES)

Tim M. Brewer, Beatriz Fernández and R. Kenneth Marcus*

The glow discharge PB/HC-OES system provides quantitative and qualitative information for biomolecules (nucleic acids here) via response curves and empirical formula calculations based on P I and C I responses.



932

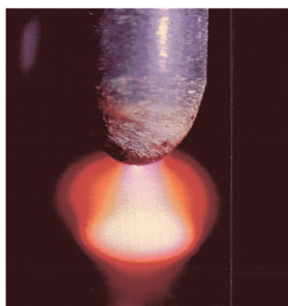


Identification of metal concentration fluctuations in waste-to-energy plant flue gases—a novel application for ICP-OES

David J. Poole,* Vida Nasserzadeh Sharifi, Jim Swithenbank and Dirk Ardelt

A mobile continuous emissions monitoring laboratory (photo) was used at a waste-to-energy plant to give unique information on temporal fluctuations in metal concentrations in un-cleaned flue gases.

939

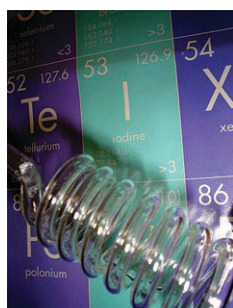


Investigations on the element dependency of sputtering process in the electrolyte cathode atmospheric discharge

Tamás Cserfalvi* and Pál Mezei*

Net atom flux in electrolyte surface sputtering is strongly dependent on the electronegativity of elements. The atomization path through the hydroxide intermediate in the cathode dark space fairly fits the observation.

945

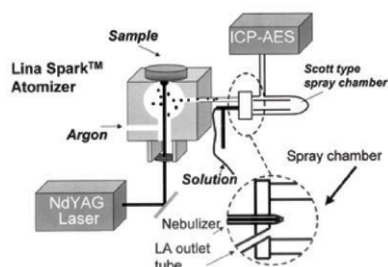


Vapour generation inductively coupled plasma optical emission spectrometry in determination of total iodine in milk

Eva Niedobová, Jiří Machát,* Vítězslav Otruba and Viktor Kanický

The vapour generation technique in hyphenation with ICP-OES enhances the sensitivity and helps to overcome spectral and matrix interferences in determination of iodine in biological samples.

950

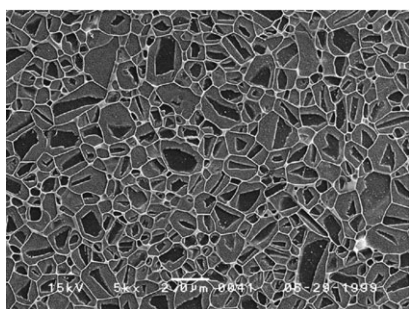


Analysis of alumina based catalysts by LA-ICP-AES using a Lina-Spark™ atomizer

C. Dubois, N. Gilon,* C. P. Lienemann, S. Morin and J. M. Mermet

The determination of platinum, tin and indium in alumina-based-catalysts was evaluated using LA-ICP-AES hyphenation. Ablation repeatability and reproducibility were found to be improved (*i.e.* $RSD < 4\%$) using a low granulometry powder.

954



Speciation of aluminium in silicon carbide by electrothermal vaporization-inductively coupled plasma atomic emission spectrometry

Jürgen Hassler, Gyula Záray,* Karl Schwetz and Karol Flórián

Determination of binder and lattice phase aluminium sintered silicon carbide (LPS-SiC) by electrothermal vaporization and inductively coupled plasma atomic emission spectrometry.

957

Investigation of a medium power radiofrequency capacitively coupled plasma and its application to high-temperature superconductor analysis *via* atomic emission spectrometry

Alpar Simon,* Tiberiu Frentiu, Sorin Dan Anghel and Simion Simon

A medium power radiofrequency CCP with low argon consumption was investigated for use in the analysis of Bi based high critical temperature superconducting materials by atomic emission spectrometry.

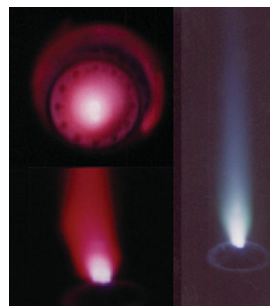


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Characterization of a very low power argon CCP

Sorin D. Anghel,* Alpar Simon and Tiberiu Frentiu

An atmospheric pressure low power CCP is examined from four points of view: stability, plasma parameters, influence of the plasma on the waveform of the rf oscillations and analytical capabilities.

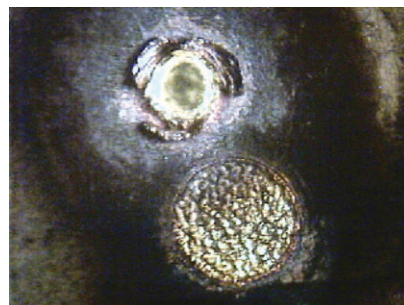


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Multi-pulse laser-induced plasma spectroscopy using a single laser source and a compact spectrometer

Gábor Galbács,* Viktória Budavári and Zsolt Geretovszky

Line emission enhancement of up to 129 and a relative standard deviation of 2–5% is achieved with the use of up to 7 laser pulses in a fiber-optic Nd:GGG LIBS system.

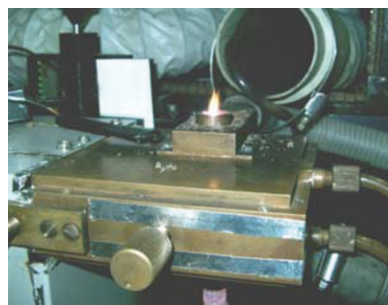


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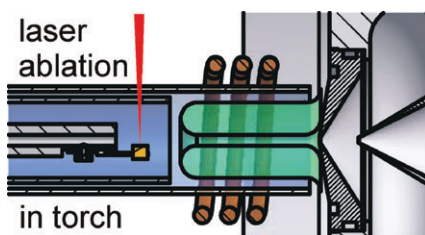
Direct atomic spectrometric analysis of aluminium oxide by continuous powder introduction into microwave induced plasma

Krzysztof Jankowski,* Adrianna Jackowska, Paweł Łukasiak, Magdalena Mrugalska and Agnieszka Trzaskowska

MIP-AES is used for the direct analysis of refractory oxide materials, for the first time. The potential of the continuous powder technique is shown in the reliable analysis of the alumina CRM for seven impurities.



987



***In torch* laser ablation sampling for inductively coupled plasma mass spectrometry**

Martin Tanner and Detlef Günther*

An ICP-MS was modified to allow *in torch* laser ablation. The transient signals were a few milliseconds in duration and the detection limit was 100 times lower than in conventional laser ablation.

990

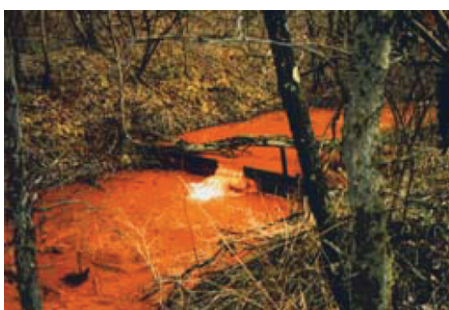


Determination of Pu isotopes in vegetation using a new on-line FI-ICP-DRC-MS protocol after microwave digestion

Vladimir N. Epov,* Karima Benkhedda and R. Douglas Evans

A new technique for the determination of plutonium isotopes in leaves using on-line ion-exchange separation and preconcentration, desolvating nebulization and ICP-DRC-MS is described. The recovery of Pu is determined for leaf species, *i.e.*, Maple, Apple, Poplar and Oak.

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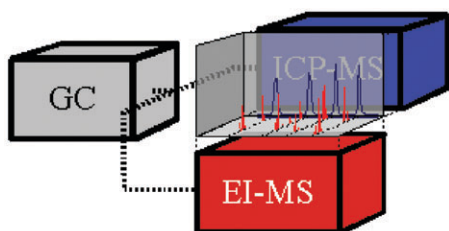


Determination of hexafluoroarsenate in industrial process waters by anion-exchange chromatography-inductively coupled plasma-mass spectrometry (AEC-ICP-MS)

Dirk Wallschläger* and Jacqueline London

The first specific method for the determination of hexafluoroarsenate is presented. Hexafluoroarsenate was the major species in two industrial process waters, and was not removed by iron hydroxide coprecipitation.

996



Parallel ICP-MS and EI-MS detection after GC separation as a unique tool for simultaneous identification and quantification of volatile heteroatomic organic compounds

Jan Kösters,* Jörg Hippler, Roland A. Diaz-Bone and Alfred V. Hirner


This concept enables simultaneous verification of the ICP-MS signal by molecule specific EI-MS data. The combination of these complementary techniques opens up various opportunities for elemental speciation of volatile analytes.

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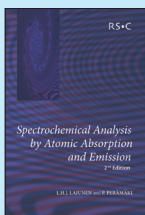
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