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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Spectrochemical analysis of Cs in water and soil using low pressure laser induced breakdown spectroscopy		
Nama/ Jumlah Penulis	:	5 Orang		
Status Pengusul	:	~~Penulis pertama~~/ Penulis ke 2 / ~~Penulis Korespondesi~~		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Spectrochimica Acta Part B: Atomic Spectroscopy
		b. Nomor ISSN	:	0584-8547
		c. Vol, No., Bln Thn	:	Vol. 132, No.-, Maret 2017
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		e. DOI artikel (jika ada)	:	10.1016/j.sab.2017.03.017
		f. Alamat web jurnal	:	https://www.elsevier.com/locate/sab
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c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	12			11,7
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12			11,8
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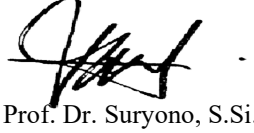

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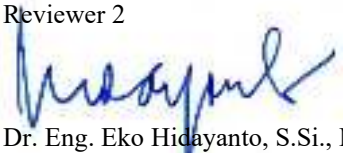

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Bidang Ilmu: Fakultas Sains dan Matematika

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a. Kelengkapan unsur isi jurnal (10%)	3,8	3,8	3,8
b. Ruang lingkup dan kedalaman pembahasan (30%)	11,6	11,7	11,65
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	11,7	11,7	11,7
d. Kelengkapan unsur dan kualitas penerbit (30%)	11,8	11,5	11,65
Total = (100%)			38,8
Nilai untuk Pengusul : (20% x 38,8/4) = 1,94			

Semarang, 24 Februari 2021

Reviewer 1

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Reviewer 2

Dr. Eng. Eko Hidayanto, S.Si., M.Si.
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Bidang ilmu/Unit kerja : Fakultas Sains dan Matematika/Fisika

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05848547

DOI
10.1016/j.sab.2017.03.017

Spectrochimica Acta - Part B Atomic Spectroscopy • Volume 132, Pages 8 - 12 • 1 June 2017

Spectrochemical analysis of Cs in water and soil using low pressure laser induced breakdown spectroscopy

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Abstract

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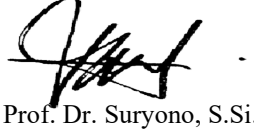

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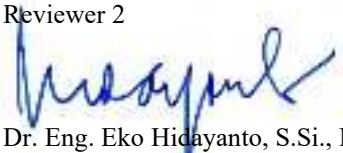

Dr. Eng. Eko Hidayanto, S.Si., M.Si.
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Bidang Ilmu: Fakultas Sains dan Matematika

An experimental study has been conducted for the practical and in situ application of laser-induced breakdown spectroscopy (LIBS) for the detection of Cs pollutant in water and soil in the nearby area of Fukushima Nuclear Power Station. The spectrochemical measurements were carried out by means of 355 nm Nd-YAG laser with N_2 and He ambient gases at atmospheric and low pressures. The soil samples were prepared by pelletizing the mixtures of 80% soil and 20% KBr while the aqueous samples were prepared as thin films electro deposited on indium tin oxide (ITO) glass. The resulted emission spectra using 0.5 kPa N_2 ambient gas shows the minimum detectable Cs concentration of 0.2 ppm and 0.3 ppm in the water and soil samples, respectively. The result of this experiment has thus demonstrated the viability of the LIBS equipment employed here as a more practical, in-situ and even mobile alternative to the standard use of gamma-ray spectroscopy using germanium detector. © 2017

Author keywords

Cs in soil; Cs in water; ITO film; Low pressure plasma; Trace radioactive pollutant

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Volume 132, 1 June 2017

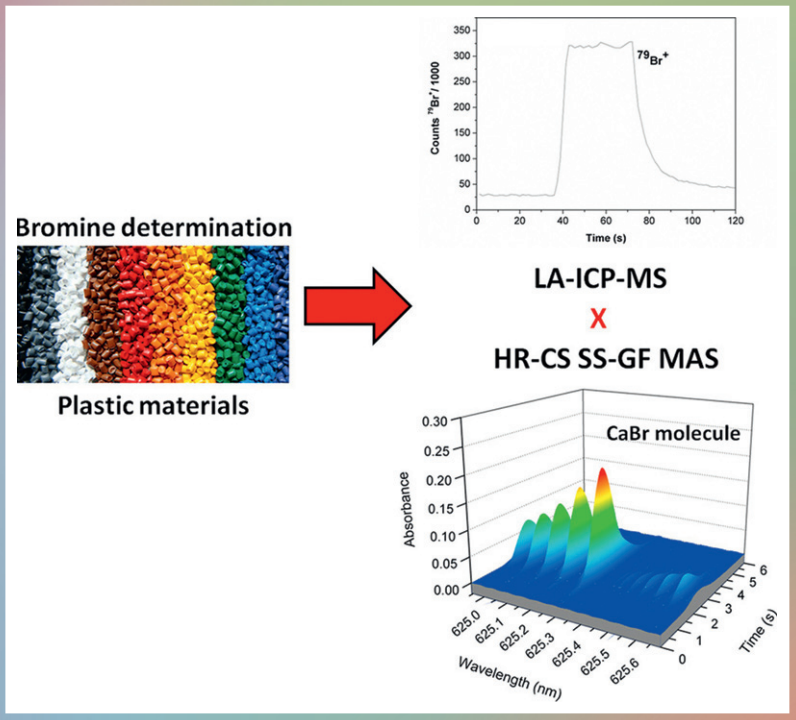
ISSN 0584-8547

SPECTROCHIMICA ACTA

PART B: ATOMIC SPECTROSCOPY

A comparison of laser ablation-inductively coupled plasma-mass spectrometry and high-resolution continuum source graphite furnace molecular absorption spectrometry for the direct determination of bromine in polymers

J.S. de Gois, S.J.M. Van Malderen, H.R. Cadorim, B. Welz and F. Vanhaecke



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Publication information: *Spectrochimica Acta Part B* (ISSN 0584-8547). For 2017, volumes 127–138 are scheduled for publication. Subscription prices are available upon request from the Publisher or from the Elsevier Customer Service Department nearest you or from this journal's website (http://www.elsevier.com/locate/sab). Further information is available on this journal and other Elsevier products through Elsevier's website (http://www.elsevier.com). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail (surface within Europe, air delivery outside Europe). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

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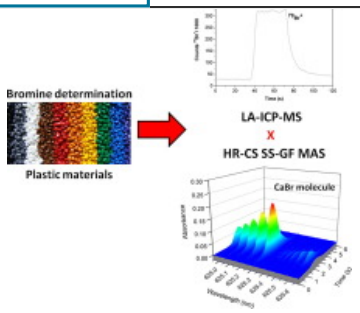

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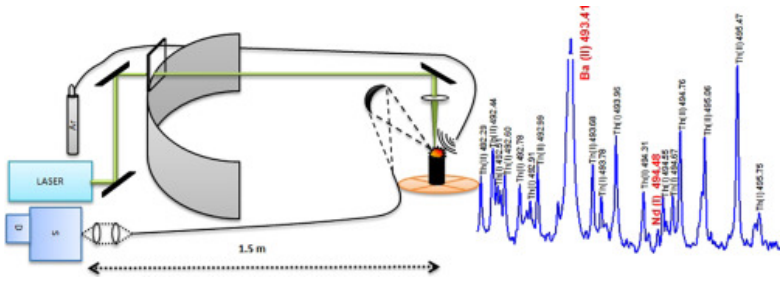
Analysis of simulated high burnup nuclear fuel by laser induced breakdown spectroscopy

Manjeet Singh, Arnab Sarkar, Joydipta Banerjee, R.K. Bhagat

Pages 1-7

Graphical abstract



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Muliadi Ramli, Ali Khumaeni, Koo Hendrik Kurniawan, May On Tjia, Kiichiro Kagawa

Pages 8-12

Graphical abstract

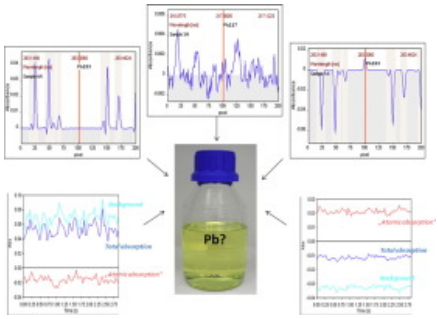
Research article Full text access

Application of high-resolution continuum source flame atomic absorption spectrometry to reveal, evaluate and overcome certain spectral effects in Pb determination of unleaded gasoline

Zofia Kowalewska, Hanna Laskowska, Michał Gzylewski

Pages 26-36

Graphical abstract



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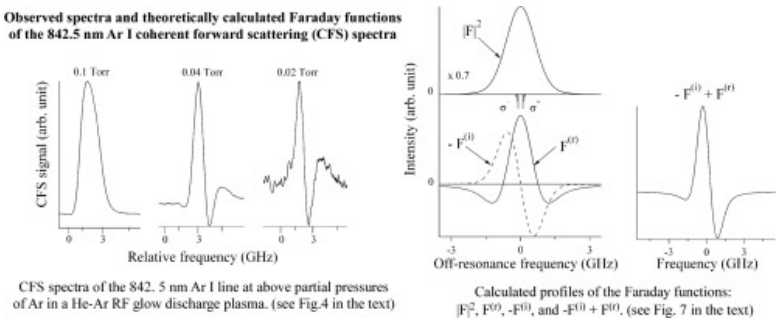
Comparison of the observed and calculated coherent forward scattering spectra of the 842.5 nm Ar I and 844.6 nm O I lines in a radio frequency glow discharge

Hideyuki Matsuta

Pages 37-42

Graphical abstract



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Revealing hidden spectral information of chlorine and sulfur in data of a mobile Laser-induced Breakdown Spectroscopy system using chemometrics

Abstract

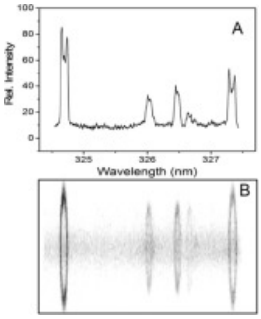
For the damage assessment of reinforced concrete structures the quantified ingress profiles of harmful species like chlorides, sulfates and alkali need to be determined. In order to provide on-site analysis of concrete a fast and reliable method is necessary. Low transition probabilities as well as the high ionization energies for chlorine and sulfur in the near-infrared range makes the detection of Cl I and S I in low concentrations a difficult task. For the on-site analysis a mobile LIBS-system (λ = 1064 nm, $E_{pulse} \leq 3$ mJ, τ = 1.5 ns) with an automated scanner has been developed at BAM. Weak chlorine and sulfur signal intensities do not allow classical univariate analysis for process data derived from the mobile system. In order to improve the analytical performance multivariate analysis like PLS-R will be presented in this work. A comparison to standard univariate analysis will be carried out and results covering important parameters like detection and quantification limits (LOD, LOQ) as well as processing variances will be discussed (Allegrini and Olivieri, 2014 [1]; Ostra et

Doppler splitting generated by shock waves in laser induced breakdown spectroscopy

Srdjan Bukvić, Miloš Skočić

Pages 56-60

Graphical Abstract

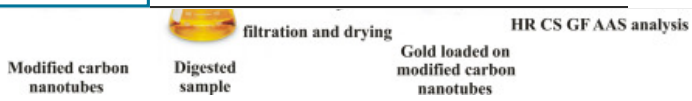


Analytical Notes

Solid sampling high-resolution continuum source graphite furnace atomic absorption spectrometry for gold determination in geological samples after preconcentration onto carbon nanotubes

Ryszard Dobrowolski, Agnieszka Mróz, Marzena Dąbrowska, Piotr Olszański

Pages 13-18



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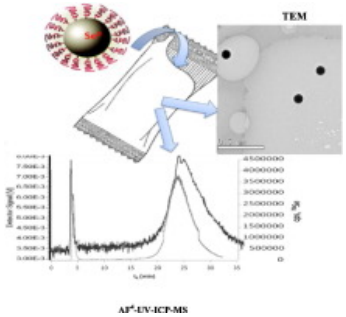
Asymmetrical flow field-flow fractionation coupled to inductively coupled plasma mass spectrometry for sizing SeNPs for packaging applications

María Palomo-Siguero, Paula Vera, Yolanda Echegoyen, Cristina Nerin, ... Yolanda Madrid

Pages 19-25

Graphical abstract



ISSN: 0584-8547

Spectrochimica Acta Part B 132 (2017) 1–7

Contents lists available at ScienceDirect

Spectrochimica Acta Part B

journal homepage: www.elsevier.com/locate/sab

Analysis of simulated high burnup nuclear fuel by laser induced breakdown spectroscopy

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ARTICLE INFO

Article history:
Received 5 October 2016
3 March 2017
Accepted 11 March 2017
Available online 16 March 2017

Keywords:
LIBS
SIMFUEL
AHWR
Argon
Nuclear

ABSTRACT

Advanced Heavy Water Reactor (AHWR) grade (Th-U)O_2 fuel sample and Simulated High Burn-Up Nuclear Fuels (SIMFUEL) samples mimicking the 28 and 43 GWd/Te irradiated burn-up fuel were studied using laser-induced breakdown spectroscopy (LIBS) setup in a simulated hot-cell environment from a distance of >1.5 m. Resolution of <38 pm has been used to record the complex spectra of the SIMFUEL samples. By using spectrum comparison and database matching >60 emission lines of fission products was identified. Among them only a few emission lines were found to generate calibration curves. The study demonstrates the possibility to investigate impurities at concentrations around hundreds of ppm, rapidly at atmospheric pressure without any sample preparation. The results of Ba and Mo showed the advantage of LIBS analysis over traditional methods involving sample dissolution, which introduces possible elemental loss. Limits of detections (LOD) under Ar atmosphere shows significant improvement, which is shown to be due to the formation of stable plasma.

1. Introduction

India constituting one-sixth of the world population is on the path of a rapid economic growth. Energy consumption being an essential part of development, per capita electricity consumption is considered as one of the index of civilization of a nation. With the rate of population growth and a bare minimum requirement of ~6000 kWh/year electrical consumption for acceptable quality of life in a society, India needs to improve its electricity generation nearly ten-folds in next four decades. Keeping this in mind, Department of Atomic Energy, India is pushing for utilisation of the vast Th resources of the country to produce electricity. Following this line of action, Advanced Heavy Water Reactor (AHWR) is being developed which will use (Th-^{233}U)O_2 fuel containing 3–3.75% U [1].

Elemental characterization of irradiated fuels is required for accessing the thermo-mechanical properties of the fuel in the post irradiation examination (PIE) stage. An unexpected value in any stage of irradiation can help to point out the possibility of a failure and the specific fuel bundle can be promptly removed. Another important reason behind elemental characterization during PIE is to know the fission yield of various fission products (FPs), which varies with the fission type (thermal or fast neutron fission) involved in the reactor and the fissile nuclei. These data also help the scientist to validate and modify reactor codes used by nuclear industry. Quantification of impurity constitutes is typically carried out by first dissolving irradiated fuels in acid solution, following bulk separation and subsequent analysis by radiometric or mass-spectrometric methods. Irrespective of the composition, the irradiated fuels due to their sintered nature are difficult to dissolve and is time consuming. It also poses high level radiation hazards, which is a driving force for developing desirable methods involving minimum sample handling procedures with an objective to minimize the radiation exposure to the workers.

Laser Induced Breakdown Spectroscopy (LIBS) being an emission spectroscopic method, has many advantages over conventional techniques, especially in the radioactive environment of nuclear industry. The notable advantages are, (i) LIBS can be a useful tool for in-situ remote analysis in hostile industrial environments at atmospheric pressure, since both the laser and emitted signal can be transmitted through optical fibres, (ii) possibility of analyzing both electrically conducting and non-conducting samples without the need of any conducting layer coating, (iii) possible to implement for fast and routine quality assurance checks during the fabrication stages, (iv) small sample requirement for the analysis, (v) micro analysis of inhomogeneous sample, and (vi) no sample preparation [2,3].

Detailed description of this technique is available in many reviews [4–6]. The possibilities of LIBS applications in the nuclear industries is reported by Wachter and Cremers in 1987 [7]. Uranium (U) has been studied by LIBS as a part of glass, reactor fuel, in solutions, in reduced pressure, as oxide, etc. [7–12]. Our group had carried out significant

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http://dx.doi.org/10.1016/j.sab.2017.03.012
0584-8547/

Spectrochimica Acta Part B 132 (2017) 26–36

Contents lists available at ScienceDirect

Spectrochimica Acta Part B

journal homepage: www.elsevier.com/locate/sab

Application of high-resolution continuum source flame atomic absorption spectrometry to reveal, evaluate and overcome certain spectral effects in Pb determination of unleaded gasoline☆

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ARTICLE INFO

Article history:
Received 14 September 2016
19 March 2017
Accepted 20 March 2017
Available online 27 March 2017

Keywords:
Lead determination
High-resolution continuum source atomic absorption spectrometry
Structured background
LSBC
Gasoline

ABSTRACT

High-resolution continuum source and line source flame atomic absorption spectrometry (HR-CS FAAS and LS FAAS, respectively) were applied for Pb determination in unleaded aviation or automotive gasoline that was dissolved in methyl-isobutyl ketone. When using HR-CS FAAS, a structured background (BG) was registered in the vicinity of both the 217.001 nm and 283.306 nm Pb lines. In the first case, the BG, which could be attributed to absorption by the OH molecule, directly overlaps with the 217 nm line, but it is of relatively low intensity. For the 283 nm line, the structured BG occurs due to uncompensated absorption by OH molecules present in the flame. BG lines of relatively high intensity are situated at a large distance from the 283 nm line, which enables accurate analysis, not only when using simple variants of HR-CS FAAS but also for LS FAAS with a bandpass of 0.1 nm. The lines of the structured spectrum at 283 nm can have "absorption" (maxima) or "emission" (minima) character. The intensity of the OH spectra can significantly depend on the flame character and composition of the investigated organic solution. The best detection limit for the analytical procedure, which was 0.01 mg L^{-1} for Pb in the investigated solution, could be achieved using HR-CS FAAS with the 283 nm Pb line, 5 pixels for the analyte line measurement and iterative background correction (IBC). In this case, least squares background correction (LSBC) is not recommended. However, LSBC (available as the "permanent structures" option) would be recommended when using the 217 nm Pb line. In LS FAAS, an additional phenomenon related to the nature of the organic matrix (for example, isooctane or toluene) can play an important role. The effect is of continuous character and probably due to the simultaneous efficient correction of the continuous background (IBC) it is not observed in HR-CS FAAS. The fact that the effect does not depend on the flame character indicates that it is not radiation scattering. For LS FAAS, the determination of Pb using the 283 nm line, a 0.1 nm bandpass and a fuel lean flame is strongly recommended. The analysis of certified reference materials, recovery studies and the analysis of real samples with low Pb content supported the satisfactory accuracy of Pb determination in automotive or aviation gasoline when the recommended analytical variants are applied.

The studies in this work shed new light on spectral phenomena in air-acetylene flames. The structured background due to absorption by the OH molecules must be taken into account during Pb determination in other materials as well as in some other elemental determinations, especially at low absorbance levels. The usefulness of HR-CS FAAS for revealing and investigating a structured background was demonstrated. HR-CS FAAS does not reveal fully corrected spectral effects with a continuous character, which can be found in LS FAAS.

1. Introduction

Lead is a very important element in the petroleum industry due to the application of tetraalkylleads (TALs) and especially the most widely used compound TEL (tetraethyllead) as an antiknock agent [1–3]. TEL, which was commercially introduced in 1923, turned out to be an efficient and useful additive to gasoline. It was estimated that the application of this compound significantly contributed to the development of transport and the global economy [2]. However, TEL has also been called "the mistake of the 20th century" [2,3]. Its poisoning effect on human health, first of all, its neurotoxicity, has been known since the beginning of TEL production, but the facts were not properly taken into account for many years. The broad application of TALs contributed to significant environmental pollution all over the world, including in Greenland snow

☆ Selected Paper from the European Symposium on Atomic Spectrometry (ESAS 2016), Eger, Hungary, 31 March – 2 April 2016.

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http://dx.doi.org/10.1016/j.sab.2017.03.020
0584-8547/