CEAMPP 2013

3rd National Conference on Electronic, Atomic, Molecular and Photonic Physics
Belgrade, Serbia, August 25th, 2013

CONTRIBUTED PAPERS

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ABSTRACTS OF INVITED LECTURES AND PROGRESS REPORTS

University of Belgrade

Faculty of Physics

Editors
B.P. Marinković, G.B. Poparić

University of Belgrade, Faculty of Physics,
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Publisher:
University of Belgrade, Faculty of Physics,
Studentski trg 12, 11000 Belgrade, Serbia

Printed by: SKRIPTA INTERNACIONAL

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

539.1(048)

NATIONAL Conference on Electronic, Atomic, Molecular and Photonic Physics (3rd ; 2013 ; Beograd)
Contributed Papers & Abstracts of Invited Lectures and Progress Reports / 3rd National Conference on Electronic, Atomic, Molecular and Photonic Physics, CEAMPP 2013, Belgrade, August 25th, 2013 ; [organized by] University of Belgrade, Faculty of Physics [with support of Ministry of Education, Science and Technological Development Republic of Serbia] ; editors B.[Bratislav] P. Marinković, G.[Goran] B. Poparić. - Belgrade : Faculty of Physics, 2013 (Belgrade : Skripta internacional). - XX, 52 str. : ilustr. ; 25 cm

Tiraž 100. - Str. III: Preface / editors. - Bibliografija uz svaki rad. - Registar.

ISBN 978-86-84539-10-8
1. Marinković, Bratislav P., 1956- [уредник] [аутор додатног текста] 2. Faculty of Physics (Beograd)
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COBISS.SR-ID 200134924

ABSTRACTS OF INVITED PROGRESS REPORTS

Time-Resolved Optical Spectra of the Laser Induced Indium Plasma detected using a Streak Camera

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Abstract
In this paper, we present the time-resolved spectral studies of plasma emission from the indium target [1 - 4]. The plasma plume formed at the surface of an indium target in air has been produced using a Q switched pulsed Nd:YAG laser at 1064 nm with a pulse duration of 5 ns. Optical emission from the target has been acquired using a streak camera [2]. In order to record the indium emission lines from the plasma plume, the detection system (spectrograph and streak camera) have to be synchronized with the Q switched Nd:YAG laser [1]. In the early stage of laser induced plasma, the emission spectra are dominated by background continuum spectra due to bremsstrahlung radiation and recombination. The emission lines corresponding to electron transitions in In I and In II are superimposed on the continuum of radiation as the plasma is cooled. The elemental analysis and plasma parameters (electron number density and electron temperature) could be determined from the indium emission spectra. Elemental analysis of the sample based on the optical emission spectra from the laser induced plasma is known as laser induced breakdown spectroscopy (LIBS). We present time-resolved LIBS spectra of atomic (In I) and ionic (In II) indium lines recorded in time range from 500 ns to 20 μs. In Fig.1 is presented the indium LIBS spectrum with the spectral range from 200 nm to 650 nm. The study of indium lines showed in this paper could be useful for detecting indium in electronic waste [2]. Our LIBS measurements are applicable for any multielemental analysis in environmental physics, food quality and ecology [2, 3].

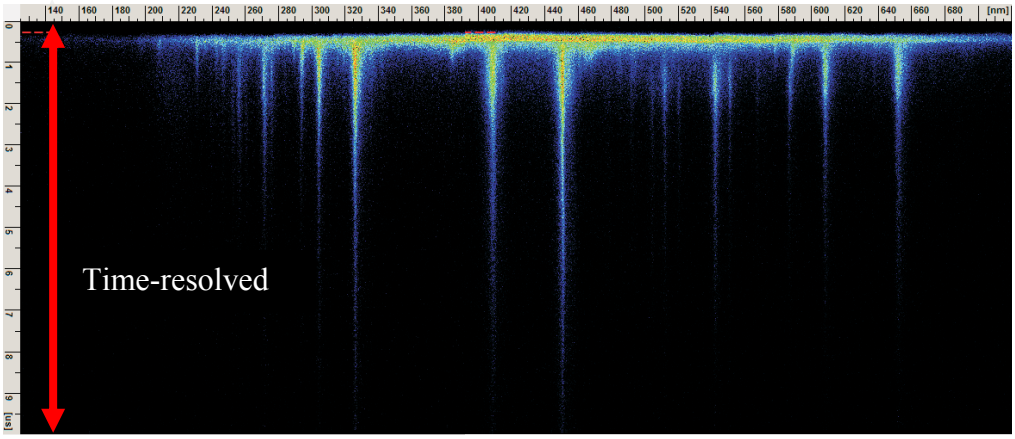

Figure 1. LIBS signal acquired from indium sample.

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Electron interaction with small heterocyclic molecules in gaseous phase

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Abstract The results of experimental and theoretical research for electron interaction with molecules that are analogue to DNA components are reported for the incident energies from 40 eV to 300 eV. Molecules used as targets are: furan, 3-hydroxytetrahydrofuran (3HTHF) and pyrimidine which are analogue to deoxyribose sugar and pyrimidine bases in DNA, respectively. The measurements were performed using a cross beam technique, for scattering angles from 20º to 110º. Experimental procedure was included measurements of relative differential cross sections (DCSs), absolute DCSs and distribution of kinetic energy of positive ions. Relative elastic DCSs were measured as a function of both the angle and the incident electron energy and the absolute DCSs were determined using the relative flow method. Energy and kinetic energy distribution of positive ions formed upon electron induced ionization of pyrimidine, DNA pyrimidine bases analogue molecule, are also reported. The calculations of electron interaction cross sections are based on a corrected form of the independent-atom method, known as the SCAR (Screen Corrected Additivity Rule) procedure, using an improved quasifree absorption model. Calculated results agree very well with the experiment, which confirm validity of both type of results in this energy and angular range. Results, experimental and theoretical, for furan, THF [1] and 3HTHF are compared and on the absolute scale these DCS are very close, showing similar redistribution of scattered electrons on all three target molecule.

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