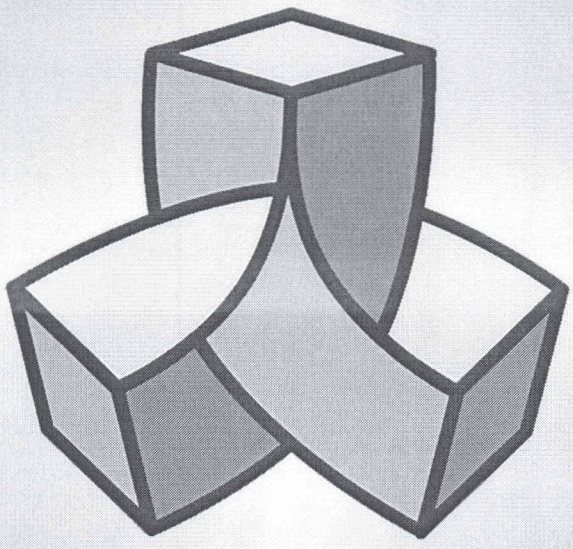
5th EU-Japan Joint Symposium on Plasma Processing

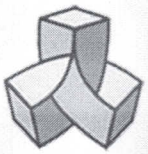
ABSTRACTS OF INVITED LECTURES, PROGRESS REPORTS AND CONTRIBUTED PAPERS



Editors:
Z. Lj. Petrović, N. Mason, S. Hamaguchi,
M. Radmilović - Rađenović

Serbian Academy of Sciences and Arts,
Institute of Physics, Zemun, Serbia

LABORATORY
FOR GASEOUS
ELECTRONICS



INSTITUTE
OF PHYSICS
BELGRADE

5th EU-Japan Joint Symposium on Plasma Processing

Radicals and Non-Equilibrium Processes in Low-Temperature Plasmas

Serbian Academy of Sciences and Arts

Institute of Physics Belgrade

Sponsors:

ESF Programme Electron Induced Processing at the Molecular Level

Optical and Electronic Device Technology for Access Network (Keio University)

Ministry of Science and Environmental protection of Serbia

Academy of Sciences and Arts of Serbia and Institute of Physics project 141025

COE Nonequilibrium processes in plasma physics and environmental science

Institute of Physics Belgrade

Hiden Analytical

Kryooprema Belgrade

Scientific Committee
Zoran Petrović (Srbija) co chairman
Nigel Mason (UK) co chairman
Satochi Hammaguchi (Japan) co chairman
Marija Radmilović-Rađenović (Serbia) secretary

Toshiaki Makabe (Japan)
Seiji Samukawa (Japan)
Kunihode Tachibana (Japan)
David Field (Denmark)
Jonathan Tennyson (UK)
Uwe Czarnetzki (Germany)

Local Organizing Committee
Zoran Petrović - co chairman
Marija Radmilović-Rađenović - secretary
Nevena Puač
Gordana Malović
Željka Nikitović
Dragana Marić
Nikola Škoro
Saša Lazović
Vesna Vučić

ELECTRON INTERACTION WITH MOLECULES OF BIOLOGICAL INTEREST

D. Pavlović, A. R. Milosavljević, D. Šević, V. Pejčev*,D. M. Filipović**
and B. P. Marinković

Institut of Physics, P. O. Box 68, 11080 Belgrade, Serbia
** Faculty of Natural Sciences, Radoja Domanovića 12, 34000 Kragujevac, Serbia*
*** Faculty of Physics, University of Belgrade, P. O. Box 368, 11001 Belgrade, Serbia*

In the Laboratory for Atomic Collision Processes of the Institute of Physics, Belgrade, we undertook a series of electron spectroscopic measurements to study electron collision with biologically relevant molecules in order to understand elementary electron driven processes in biological systems. We investigated two simplest amino acids glycine and alanine [1] and tetrahydrofuran (THF) [2]. Elastic electron scattering from glycine and alanine has been studied using a crossed electron-molecule beam apparatus ESMA in details described elsewhere [3]. The elastic differential cross sections for elastic electron-alanine and electron-glycine scattering were measured at electron impact energies from 20eV to 80eV and within scattering angles from 10^{o} to 150^{o}. Electron energy loss spectra (EELS) of these molecules were also obtained at impact energies from 20eV to 80 eV at small scattering angles, up to 5^{o}. Results were compared with available theoretical studies.

THF molecule which could be considered as the simplest prototype for investigation of electron interaction with deoxyribose molecules and DNA sugar backbone, was investigated to evaluate radiation damage to living cells that could be responsible for most genotoxic effects. Differential cross sections for elastic electron scattering by THF measured in the agular range from 20^{o} to 180^{o} at the impact energy of 10 eV as well as EELS of gaseous THF for incident energies of 50 eV and 100 eV were recorded using electron spectrometer UGRA [4].

[1] D. Pavlović, D.M. Filipović, V. Pejčev,D. Šević and B.P. Marinković, *Proc. 23rd Symposium on Physics of Ionized Gases* – SPIG'2006, Contributed Papers and Abstracts of Invited Lectures, Topical Invited Lectures and Progress Reports, 28 August – 1 September 2006, Kopaonik, Serbia, Ed. N. Simonović, B. P. Marinković and Lj. Hadžievski (Belgrade, Institute of Physics) Contributed Paper 1P12, pp. 67 – 70.

[2] A. R. Milosavljević, I. Linert, M. Dampc, B. P. Marinković, and M. Zubek, *Proc. 23rd Symposium on Physics of Ionized Gases* – SPIG'2006, Contributed Papers and Abstracts of Invited Lectures, Topical Invited Lectures and Progress Reports, 28 August – 1 September 2006, Kopaonik, Serbia, Ed. N. Simonović, B. P. Marinković and Lj. Hadžievski (Belgrade, Institute of Physics) Contributed Paper 1P05, pp. 37 – 40.

[3] R. Panajotović, D. Šević, V. Pejčev, D.M. Filipović and B.P. Marinković, Int. J. Mass Spectrom. **233**, 253 (2004).

[4] A R Milosavljević, D Šević and B P Marinković,*J. Phys. B: At. Mol. Opt. Phys.* **37** , 4861 (2004).

ELECTRON COLLISIONS BY METAL ATOMS

S. Milisavljević, M. S. Rabasović, B Predojević*, D. Šević, V. Pejčev**,D. M. Filipović*** and B. P. Marinković

Institut of Physics, P. O. Box 68, 11080 Belgrade, Serbia
**Faculty of Natural Sciences, University of Banja Luka, Republik of Srpska,Bosnia and Herzegovina*
*** Faculty of Natural Sciences, Radoja Domanovića 12, 34000 Kragujevac, Serbia*
**** Faculty of Physics, University of Belgrade, P. O. Box 368, 11001 Belgrade, Serbia*

Electron collisions by metal atoms are of both applied and fundamental interest. In order to understand the properties of atomic systems and their structure, we undertook a series of electron spectroscopic measurements on different metal atoms: Ca, Mg, Yb, Zn , Pb and In [1-6]. The electron spectrometer ESMA used in this experiment is designed for crossed electron atom beam measurements in which an atomic beam was perpendicularly crossed by monoenergetic electron beam. The metal vapour beams have been produced by heating ovens crucible containing corresponding metal atoms. Electron impact excitation and elastic scattering have been studied in the energy range from 10 to 100 eV and at scattering angles from 0^o for excitations and from 10^o for elastic scattering up to 150^o. Absolute excitation differential cross sections (DCSs) values were determined through the normalization of relative DCS to the optical oscillator strength (OOS) utilizing the forward scattering function (FSF) for generalized oscillator strengths (GOS). Absolute elastic DCSs have been obtained from the elastic-to-inelastic intensity ratio at each impact energy. Experimental DCSs were extrapolated to 0° and 180° and numerically integrated to yield integral, momentum transfer and viscosity cross sections.

[1] S Milisavljević, D Šević, R K Chauhan, V Pejčev, D M Filipović, R Srivastava and B P Marinković, *J. Phys. B: At. Mol. Opt. Phys.* **38** (2005) 2371.
[2] D M Filipović, B Predojević, V Pejčev, D Šević, B P Marinković, Rajesh Srivastava and A. D. Stauffer, *J. Phys. B: At. Mol. Opt. Phys.* **39** (2006) 2583.
[3] B Predojević, D Šević, V Pejčev, B P Marinković and D M Filipović, *J. Phys. B: At. Mol. Opt. Phys.* **38** (2005) 1329.
[4] Dmitry V. Fursa, Igor Bray, and R. Panajotović, D. Ševic, V. Pejčev, D. M. Filipović and B. P. Marinković, *Phys. Rev. A* **72** (2005) 012706.
[5] B P Marinković, V Pejčev, D M Filipović, D Šević, S Milisavljević and B. Predojević, *Rad. Phys. Chem.* **76** (2007) 455.
[6] M. Pardjovska, S. Milisavljević, V. Pejčev, D. Šević, D.M. Filipović, B.P. Marinković, V. I. Kelemen, E. Yu. Remeta and E. P. Sabad, Proc. 23rd SPIG'2006, August 28th- September 1st 2006, Kopaonik, Serbia, Ed. Nenad S. Simonović, Bratislav P. Marinković and Ljupčo Hadžijevski (Belgrade, Institute of Physics) Contributed Paper, pp. 71 – 74.