



Symposium on Radiation Effects of Biomedical Interest

Thursday 22nd -Sunday 25th February 2007

Consejo Superior de Investigaciones Científicas,
Madrid



This meeting is supported by



Hospital Universitario La Paz

Comunidad de Madrid



<http://www.isa.au.dk/networks/cost/wg1/2007/index.html>

Electron scattering by zinc atom

B. P. Marinković^{1,2}, V. Pejčev¹, D. Šević^{1,2}, M. Krunic², D. M. Filipović^{1,3}, F. Blanco⁴ and G. García⁵

¹ Institute of Physics, Pregrevica 118, Belgrade, 11080, Serbia

² Advanced School of Electrical Engineering, V. Stepe 283, Belgrade, 11000, Serbia

³ Faculty of Physics, Studentski trg 16, Belgrade, 11000, Serbia

⁴ Dept. de Física Atómica Molecular y Nuclear, Facultad de Ciencias Físicas, Universidad Complutense, Avenida. Complutense s/n, E-28040 Madrid, Spain

⁵ Instituto de Matemáticas y Física Fundamental, Consejo Superior de Investigaciones Científicas, Serrano 121, 28006, Madrid, Spain

Role of zinc atom in biomedical systems has been investigated in several areas: zinc-finger proteins for DNA recognition [1,2]; myoglobin oxidation [3] and concentrations in human blood and serum [4]. We have extended our research of binary interactions of low energy electrons with zinc atom in order to broaden the energy range of elastic scattering cross section determination [5]. Calculations have been performed on the basis of the improved imaginary part of a non-empirical model potential for electron scattering [6]. Differential cross sections for elastic and absorption scattering were calculated in the wide range of energies from 1 to 10000 eV. Also, total cross sections were calculated in the same energy range. Experimental investigations were carried out at 60, 80 and 100 eV where differential cross sections for elastic scattering were obtained. Absolute experimental values were deduced from the intensity ratios of the resonance (the 4^1P_1 state) and elastic scattering at 10° and by using previously obtained absolute values for the resonance excitation [7]. At the overlapping energies the differential cross sections show good agreement between experiment and calculations.

The work has been performed within the MSEP project 141011 of Republic Serbia and EU COST action P9 (RADAM).

[1] S. Durai, M. Mani, K. Kandavelou, J. Wu, M. Porteus and S. Chandrasegaran, "Zinc finger nucleases: custom-designed molecular scissors for genome engineering of plant and mammalian cells", *Nucleic Acids Res.* **33** (18): 5978-90 (2005).

[2] F. D. Urnov, J. C. Miller, Y. Lee, C. M. Beausejour, J. M. Rock, S. Augustus, A. C. Jamieson, M. H. Porteus, P. D. Gregory and M. C. Holmes, "Highly efficient endogenous human gene correction using designed zinc-finger nucleases", *Nature* **435** 646 (2005).

[3] S. V. Lepeshkevich, A. L. Poznyak and B. M. Dzhagarov, "Influence of zinc ions on the geminal and bimolecular stages of the horse-myoglobin oxygenation", *J. Appl. Spectros.* **72** (5) 735 (2005).

[4] A.I. Helala, N.F. Zahrana, A.M. Rashad, "Isotopes and concentrations of Zn in human blood and serum by ICP-MS", *Int. J. Mass Spectrom.* **213** 217 (2002).

[5] R. Panajotovic, V. Pejcev and B. Marinkovic, "Differential cross sections for electron elastic scattering by zinc atom", *Proc. XXI ICPEAC, Sendai, Japan, 1999, Abstracts of Contributed Papers*, p. 183.

[6] F. Blanco and G. García, "Improvements on the imaginary part of a non-empirical model potential for electron scattering (300-10000 eV energies)" *Phys.Lett. A* **296** (4) 178 (2002).

[7] D. V. Fursa, I. Bray, R. Panajotović, D. Šević, V. Pejčev, D. M. Filipović and B. P. Marinković, "Excitations of 1P levels of zinc by electron impact on the ground state", *Phys. Rev. A* **72** 012706 (2005).

x CF
16