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ELECTRON - Zn ATOM CROSSED BEAM EXPERIMENT

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Electron scattering by atoms of the IIb group of the Periodic System of Elements have been the main subjects of our interest. We measured differential cross sections for electron impact on cadmium atom [1] and mercury atom[2], while we now work on the zinc atom, which happen to be the least investigated.

To our knowledge, there are no recent experimental data of differential cross sections for either elastic or inelastic electron scattering on Zn except that from Williams and Bozinis (1978)[3] who measured DCSs for the elastic scattering and for the excitation of four states, at 40eV incident electron energy. This is rather surprising considering that zinc represents one of the widely used substances in nowadays technology: lasers, rocket fuel, electronics, etc. It is also interesting from the fundamental point of view because it belongs to heavy atoms for which spin-orbit interaction significantly modifies the shape of the differential cross sections. There are only two recent theoretical papers on this subject, first by McGarrah et al (1991) [4] who calculated elastic differential and total cross sections, from 12.5 to 200 eV, and second by Kaur et al (1997) [5], who calculated DCSs, Schermann functions and Stokes parameters for three incident electron energies (10, 20 and 40 eV) for the first four excited states.

Our experiment is of the crossed-beam type and it was described elsewhere[1,2]. For this particular purpose we have constructed a new oven (Fig.1) in order to attain higher ultimate temperatures and better temperature control. The crucible is made of titanium[6] which is completely resistive to zinc vapour and it is placed into the stainless steel cylinder which bears two heaters - one at the top and the other at the lower half, thus providing the temperature difference of about 100°C. We used a titanium foil to make a reflective shield around the oven an on its top end. Temperature monitoring has been carried on by two thermocouples, at the bottom and on the top of the crucible.

At the Conference we will present our DCSs for elastic and inelastic scattering for electrons of the incident energy from 20 to 80eV, in the angular range from 10 to 150°.

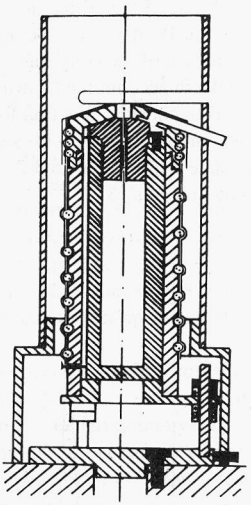

Figure 1

Reference

[1] B. Marinkovic , V. Pejcev , D. Filipovic and L. Vuskovic, J.Phys.B:At.Mol.Opt.Phys. 24, 1817 (1991)

[2] R. Panajotovic , V.Pejcev , M. Konstantinovic, D. Filipovic, V. Bocvarski and B. Marinkovic, J.Phys.B:At.Mol.Opt.Phys. 26, 1005 (1993)

[3] W. Williams and D. Bozinis, Phys.Rev.A 12, 57 (1975)

[4] D.B. McGarrah, A.J. Antolak and W. Williamson Jr., J.Appl.Phys. 69(10), 6812 (1991)

[5] Savinder Kaur, R. Srivastava, R.P. McEachran and A.D. Stauffer J.Phys.B:At.Mol.Opt.Phys. 30, 1027 (1991)

[6] K.J. Ross and B. Sonntag, Rev.Sci.Instrum. 66, 4409 (1995)

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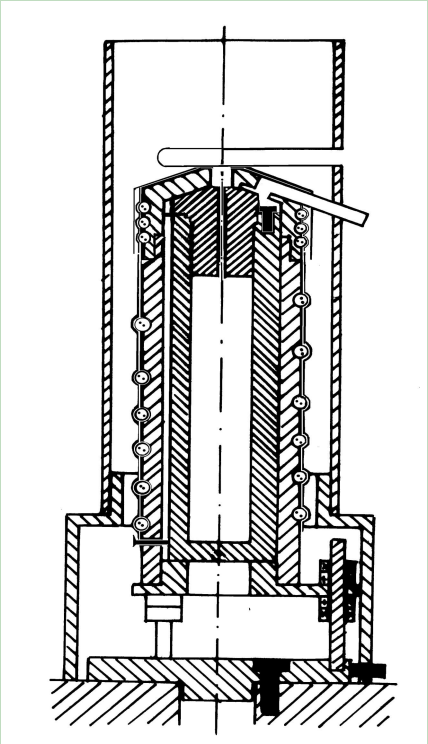

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