

ELECTRONIC
AND ATOMIC
COLLISIONS

ABSTRACTS OF CONTRIBUTED PAPERS

Fifteenth International
Conference on the Physics
of Electronic and Atomic
Collisions

Brighton, United Kingdom 1987

Edited by J. Geddes, H.B. Gilbody, A.E. Kingston, C.J. Latimer, H.J.R. Walters

DIFFERENTIAL CROSS SECTIONS FOR ELECTRON IMPACT ON Cd ATOM

B.Marinković, V.Pejčev, D.Filipović and L.Vušković

Institute of Physics, P.O.Box 57, 11001 Belgrade, Yugoslavia

Relative differential cross sections (DCS) for elastic and inelastic electron scattering by cadmium atom have been obtained for 20, 40 and 60 eV impact energies and from 0° to 150° scattering angles. A crossed electron - atom beam technique has been used in the electron spectrometer already described earlier¹. Atomic beam has been produced by heating Cd metal in a wire heating oven to 310°C when its pressure is 10 Pa.

An energy loss spectrum of cadmium atom with 45 meV energy resolution at 40 eV electron impact energy and 5° scattering angle is shown in Fig. 1. Dominant feature in all energy loss spectra of Cd is the excitation from the ground 5¹S₀ to the 5¹P₁ (5.417 eV) state. On this spectrum, excitations to the 3¹P₁ and series n¹S₀ (n=6,7,8), n¹P₁ (n=5 through 11) and n¹D₂ (distinguished from (n-1) ¹P₁ peaks for n=5,6,7) all converging to the first ionization limit ²S_{1/2}(8.994 eV) are visible. At lower impact energy and larger scattering angles, excitations to the 5³P₀, 6³S₁ and 6³P₁ are also tracable.

Relative DCS for the elastic scattering and excitation of the 5¹P₁ state were separately determined.

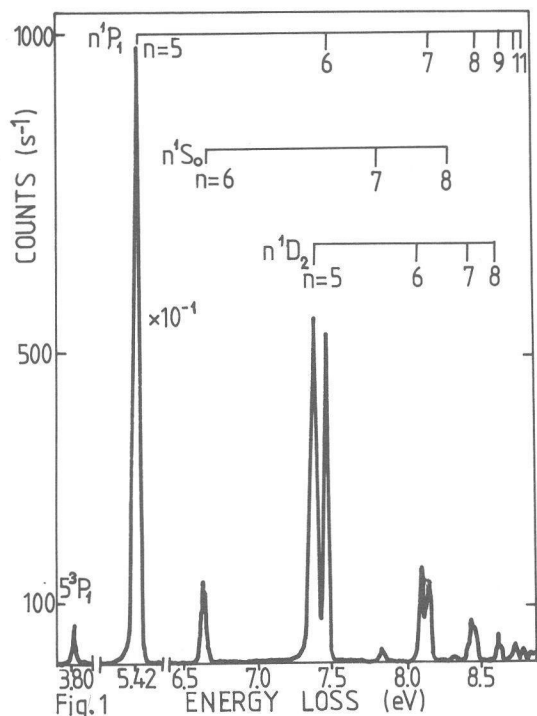


Fig.1

From each spectrum, ratio of the intensity of a spectral feature to the intensity of the reference transition was obtained. DCS for elastic scattering were put on the same relative units scale as DCS for the reference state

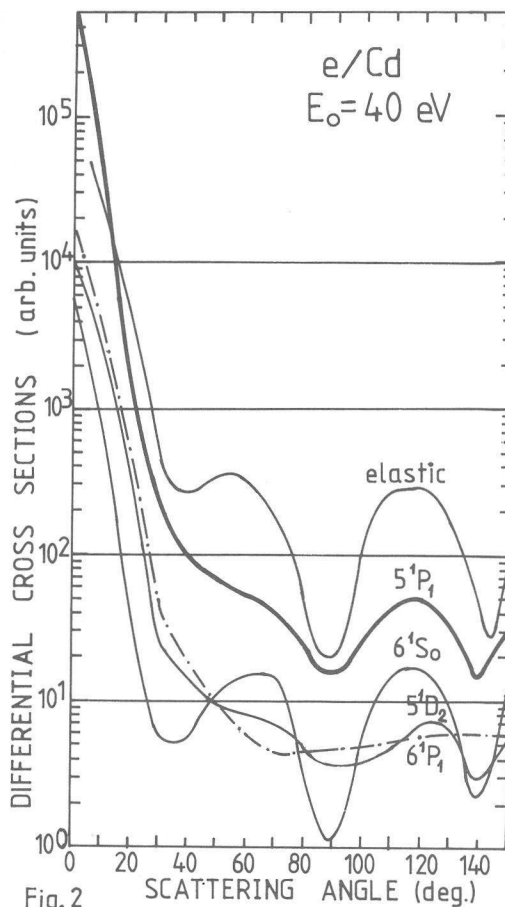


Fig.2

by determining their intensities at 20° scattering angle. Corrections were done due to different transmission of analyzing system for electrons with different residual energies. Relative DCS for elastic scattering and excitations of the 5¹P₁, 6¹S₀, 5¹D₂ and 6¹P₁ states at 40 eV electron impact energy are shown in Fig. 2 all in the same arbitrary units.

In order to put results on absolute scale, normalization to generalized oscillator strengths obtained by Newell et al.² will be performed.

This work is supported by the U.S.-Yugoslav Joint Fund for Scientific and Technological Cooperation, in cooperation with the NBS (JFP 598) and RZN Srbija, Yugoslavia.

References:

1. B. Marinković, Cz. Szmytkowski, V. Pejčev, D. Filipović and L. Vušković, J. Phys.B. 19, 2365 (1986)
2. W.R.Newell, K.J. Ross and J.B.P.Wickes, J.Phys. B. 4, 684 (1971).