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(Eds. H. Hotop, M.-W. Ruf)

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EXCITATION OF THE FIRST FOUR VALENCE STATES OF H_2S BY LOW ENERGY ELECTRONS

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Utilizing the cross electron-beam molecular-beam scattering technique, energy-loss spectra covering the energy region from 4.5 to 10.5 eV. Excitation of the first valence states $^{3,1}B_1$ and $^{3,1}A_2$ states was observed as a broad feature. The maximum of the feature moves to the smaller energy-losses when the impact energy is lowered and the scattering angle increased. The excitation occurs in two molecular orbitals: $6a_1$, non-bonding mixed valence and Rydberg orbital, and $3b_2$, anti-bonding valence orbital. On the broad feature there were observed four superimposed peaks with 142 meV energy separation. These could be attributed to vibrational bending mode ν'_2. The small difference from the mode frequency of the ground state (147 meV) indicates very small change of molecular geometry after the excitation and confirms non-bonding character of the orbital. The cause of the extreme width of the feature probably lies in the process of the predissociation. Unfortunately, theoretical calculation exists only for the A_1 symmetry but not for the B_1 nor A_2.

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A CYLINDRICAL TROCHOIDAL MONOCHROMATOR DESIGNED FOR LOW ELECTRON ENERGY COLLISION STUDIES

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A new cylindrical trochoidal monochromator was designed to study threshold electron excitation of Na [1]. It consisted of two 250 mm in length coaxial gold-plated copper cylinders with 4.5 and 7.5 mm radii. The 1-mm-diam entrance and exit apertures were separated by 180^0 on a 6.0-mm radius. The monochromator provided energy selection for the electron beam in crossed electric and magnetic fields. Electrons experienced trochoidal motion with the perpendicular net-drift velocity. The beam energy transmitted by the monochromator was typically 0.3 eV. In the 35 Ga magnetic field and an electric field of ~1.5 V/cm this yielded compensation of a beam-shape distortion that normally occurs in planar trochoidal monochromators. This distortion results from the energy difference, hence axial velocity difference, between electrons traveling at different positions in the electric field direction. In a cylindrical monochromator this extra velocity can be compensated by a shorter circumferential path around 180^0 to the exit aperture. The optimum achieved results were 30-40 meV FWHM at 30 nA current, and ~70-meV resolution at 150 nA. The disadvantage of the design is that the low-energy beam is exposed to a very large surface area, and contact-potential variations can easily cause problems.

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[1] B.Marinković, Ping Wang and Alan Gallagher, *Phys.Rev.A* **46** 2553 (1992)