

MO 11 VUV Spectroscopy

Zeit: Montag 11:00–12:00

Raum: H10

MO 11.1 Mo 11:00 H10

Two-Color Photoionization of Bromine — ●JÜRGEN PLENGE^{1,2}, CHRISTOPHE NICOLAS³, ALISON CASTER², MUSA AHMED³ und STEPHEN R. LEONE^{2,3} — ¹Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg — ²Departments of Chemistry and Physics, University of California, Berkeley, California 94720 — ³Lawrence Berkeley National Laboratory, Berkeley, California 94720

Two-color photoionization of molecular bromine (Br₂) has been studied by photoelectron spectroscopy using vacuum ultraviolet (VUV) synchrotron radiation and visible Nd:YLF laser light. The experiments were carried out on the Chemical Dynamics Beamline at the Advanced Light Source (Berkeley, USA). The second harmonic of the 1 kHz pulsed Nd:YLF laser was used to excite the X(¹Σ_g⁺, v'' = 0) → B(³Π, v' = 28, 29) transitions of Br₂ near 527 nm. The long-lived B(³Π) state of Br₂ was ionized using VUV radiation in the photon energy range 8.5-10 eV. The ejected photoelectrons were detected utilizing a velocity map imaging detector and photoelectron energy distributions were measured. The obtained two-color photoionization spectra are compared with VUV one-color photoionization spectra. Distinct differences in the photoelectron kinetic energy distributions of both photoionization schemes are observed and discussed with the aid of Franck-Condon calculations.

MO 11.2 Mo 11:15 H10

UV/VIS-Fluoreszenzspektroskopie von 2p-angeregtem Schwefelwasserstoff — ●ROMAN FLESCH¹, JÜRGEN PLENGE¹, MICHAEL MEYER² und ECKART RÜHL¹ — ¹Institut f. Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg — ²LIXAM, Centre Universitaire Paris-Sud, Bat. 350, F-91898 Orsay Cedex, Frankreich

Die radiative Relaxation von Schwefelwasserstoff (H₂S) nach Anregung im 2p-Nahkantenbereich wird mit Hilfe der UV/VIS - Spektroskopie untersucht. Dispergierte Undulatorstrahlung wird zur selektiven Erzeugung von 2p-angeregten Rydberg- und Valenzzuständen genutzt. Es werden ausgeprägte Unterschiede in den Fluoreszenzspektren in Abhängigkeit vom primären Anregungszustand beobachtet. Die Anregung von Rydbergzuständen führt nahezu ausschließlich zur Bildung leuchtender *atomarer* Fragmente (H, S⁺, S⁺⁺). Die Anregung von Valenzzuständen liefert zusätzlich *molekulare* Banden, die dem Übergang A³Π → X³Σ⁻ des einfach geladenen Photofragments HS⁺ zugeordnet werden. Die beobachteten Banden werden im Hinblick auf die Fragmentationsdynamik der 2p-angeregten Valenzzustände diskutiert.

MO 11.3 Mo 11:30 H10

Probing the dicationic final states in CO using KVV normal Auger transitions — ●RALPH PÜTTNER¹, XIA-JING LIU², GEORG PRÜMPER², TORALF LISCHKE², VINCENZO CARRAVETTA^{2,3} und KIYOSHI UEDA² — ¹Freie Universität Berlin, Institut für Experimentalphysik, Arnimallee 14, 14195 Berlin, Germany — ²Inst. Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai 980-8577, Japan — ³IPCF- CNR, 56124 Pisa, Italy

It is well known that the KVV normal Auger spectra of CO subsequent to the C 1s and O 1s photoionization exhibit a rich vibrational fine structure, which is due to the fact that the resulting dications are stable with respect to dissociation. We present high-resolution normal Auger spectra together with the corresponding photoelectron spectra. All four spectra are fitted parallel using a Franck-Condon fit procedure which allows to take vibrational lifetime interference contributions into account. With this analysis we were able to identify for the first time contributions of the O 1s⁻¹ → X³Π Auger transition in the spectrum. In addition, the equilibrium distances, vibrational energies, and anharmonicities for the dicationic final states X³Π, a¹Σ⁺, b¹Π, A³Σ⁺, and d¹Σ⁺ were derived and compared with theoretical results [1]. While for the final states a¹Σ⁺, b¹Π, A³Σ⁺, and d¹Σ⁺ an excellent agreement between experiment and theory is found, we observe significant differences for the state X³Π. We assume that these differences are due to an avoided level crossing which is not taken into account in the calculations.

[1] J. H. D. Eland *et al.*, J. Phys. B **37**, 3197 (2004).

MO 11.4 Mo 11:45 H10

Accidental predissociation of the N₂⁺(C ²Σ_u⁺) state observed in the C ²Σ_u⁺ - X ²Σ_g⁺ fluorescence after vibrational selective excitation of the 1s⁻¹π* resonance — ●L WERNER¹, S KLUMPP¹, A EHRESMANN¹, PH DEMEKHIN^{2,3}, M LEMESHKO², V SUKHORUKOV^{2,3}, K-H SCHATNER⁴, and H SCHMORANZER³ — ¹Institute of Physics, University of Kassel, D-34132 Kassel — ²Rostov State University, 344038 Rostov-on-Don — ³TU Kaiserslautern, D-67653 Kaiserslautern — ⁴Justus-Liebig-University, D-35392 Giessen

N₂⁺(C - X) fluorescence was investigated by photon-induced fluorescence spectroscopy after vibrational selective excitation of the 1s⁻¹π* resonance in the fluorescence wavelength range between 135nm - 205nm. One peculiarity of the N₂⁺(C - X) fluorescence after direct excitation of the N₂⁺(C) state is the strong intensity decrease for bands with v' ≥ 3. In a first experiment only band sequences with Δv=const. could be observed but with an improved fluorescence resolution of 0.1nm it was possible to observe single fluorescence bands with Δv=-6/-7. Calculations predict a maximum of the fluorescence intensity at Δv = -5 if accidental predissociation is taken into account. With a very narrow fluorescence resolution of about 0.1nm it was even possible to resolve individual vibrational bands. Observed fluorescence intensities for the individual vibrational sequences of the C-X transition and measured cross sections of the C-X fluorescence for vibrational sequences were compared to calculations with taking into account accidental predissociation and molecular rotation. The calculated intensities and describe well the shape of both individual vibrational bands and the whole band system.