ANIONIC PHOTOFRAGMENTATION OF CO AND H_2S

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Measurements of electron, photon or ion yields as a function of photon energy in the region of inner-shell thresholds have long been known and used as a powerful probe of molecular spectroscopy, symmetry and photoionization dynamics. Recently, anionic photofragmentation of molecules has been shown to give new experimental insight on resonant and nonresonant core-level processes[1]. Anion spectroscopy constitutes a highly selective probe, yielding information unobtainable with absorption or electron spectroscopy. Here we present new results of cation and anion partial yields following photofragmentation of CO and H_2S around the carbon K edge and the sulphur $L_{2,3}$ edges respectively,. The measurements were obtained using synchrotron radiation on undulator beamline 8.0.2 at the Advanced Light Source. In the case of CO, the continuum shape resonance appears to be completely suppressed in the O^- production yield as a function of photon energy, whereas the measurements show a clear enhancement of the doubly excited resonances above the carbon K-edge. Immediately above threshold anion formation is shown to be moderated by post-collision interaction and can be described by a molecular semi-classical recapture probability model[2]. A similar behavior for suppression of the continuum features allowing enhancement of the doubly excited resonances and that for PCI was observed for H_2S near the sulphur $L_{2,3}$ edges.

[1]W.C. Stolte et al., Phys. Rev. Lett. **86** (2001), 4504.
[2]G.B. Armen and J.C. Levin, Phys. Rev. A **56** (1997) 3734.