Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

Quantum Efficiency Seminar und Colloquium

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Electronic Structure Dynamics at the L-edge of Transition Metal in Solution

The non-radiative dark channels in the L-edge fluorescence spectra from transition-metal (TM) aqueous solution are an electronic-structure signature of the ultrafast charge-transfer processes playing an important role in many biological and chemical systems.[1] These spectral dips, with respect to the X-ray transmission spectrum, result from yet poorly understood electronic de-excitation based on qualitative observation. We explore the nature of the underlying decay mechanism of 2p core-excited Co^{2+} in water by probing the non-radiative Auger-type electron emission channel using photoelectron spectroscopy from a liquid microjet. The measurements demonstrate that the resonant part of the dip observed in the total-fluorescence-yield (TFY) X-ray absorption spectrum (XAS) is due to metal-to-water charge transfer.[2] This is directly revealed from the resonant enhancement of valence signal intensity arising from the interference of two identical final states created by a direct and Auger-electron emission, respectively. Recently, we could detect separately the X-ray fluorescence of the solvent and the solute with moderated high resolution. This has been done using our recently developed high resolution X-ray emission spectrometer on micro-jet,[3, 4] with further developments for the spectrometer to allow us measuring the partial and the inverse partial fluorescence yield from the L-edge of transition metal.[5]

References

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Date: **Tuesday, July 17th, 2012 14:15 pm**
Location: **Lecture Hall 1, Hermann-Herder-Str. 3, Freiburg**

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