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Resonant Inelastic Soft X-ray Scattering with Vibrational Resolution

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Most fundamental questions regarding the function of complex molecular systems are related to different molecular building blocks and their local electronic and dynamic properties. Resonant Inelastic X-ray Scattering (RIXS) has for a long time allowed access to site-specific electronic structure information on the atomic length scale. As a photon-in/photon-out technique, it is also ideally suited for the investigation of liquids. However, the lack of adequate sources has up to now limited the access to direct information about local coordination and dynamics and only a fraction of the inherent advantages have been exploited.
We present RIXS spectra of liquids (acetone, water) and gases (O2, CO2) excited at the oxygen K-edge with a resolution o of E/dE˜10000. For the first time, we are able to resolve single vibrational modes, opening a wealth of new possibilities such as mapping local potential energy surfaces of the electronic ground state which no other technique can access. Highly energy resolved spectra obtained at the ADRESS beamline at the SLS are presented along with ab-initio multimode scattering calculations that resemble the data in very high detail.

Please specify the session

resonant inelastic and elastic x-ray scattering

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Talk

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