Synchrotron DUV microscopy and mass spectrometry for cells and molecules

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DISCO Beamline is a bending magnet beamilne at synchrotron SOLEIL covering the unusual 1-21 eV energy range. It is composed of two branches and three endstations, SRCD, Atmospheric pressure photoionisation and DUV imaging. We will focus on the last two.

- Use of deep ultraviolet (DUV, below 350 nm) fluorescence opens up new possibilities in biology because, it does not need external specific probes or labeling, but instead takes profit of the intrinsic fluorescence that arise from many biomolecules under deep ultraviolet excitation. Indeed, observation of label free biomolecules or active drugs ensures that the label will not modify the biolocalisation or any of its properties. UV monophotonic excitation does present real spectral excitation, leading the way to excitation imaging and a better selectivity of the chromophores. DUV excitation may also be used to track exogenous drugs or toxic compounds that present different spectral behaviour. Moreover, due to diffraction limit the lateral resolution is always increased when looking in the UV range allowing nanometric spatial resolution[3]. Examples in cell biology, enzymology and tissue diagnosis will be presented and compared to multiphotonic excitation.

- The APEX branch of DISCO beamline is equipped with a differential pumping system that may be coupled to a large variety of experimental systems. We couple either an APPI QTOF for photoionisation MS of hydrophobic molecules or a modified ion trap for VUV photoionisation dissociation (VUV-PID). Examples of applications on better ionisation of hydrophobic peptides in MS will be presented as well MS3 studies on complexes of naturally unstructured proteins interactions with specific ligands.

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