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Photon-Based Characterization of Energy Materials in Both the Energy and Time Domain

Photocatalytic processes occur in solution and/or at interfaces. To understand and thus improve photocatalytic functionalities, analytical probes sensitive in bulk-solution or at interfaces are vital. For this, we develop and apply X-ray-based analytical tools for **a complete characterization of the molecular - electronic and nuclear - structure of catalytical materials**. In my talk, I will present the photo-induced spin-flip in Fe(II) complexes represents an ultrafast phenomenon that has the potential to become an alternative to conventional processing and magnetic storage of information as an example for system studied by our team. We applied ultrafast XUV photoemission spectroscopy[1] to track the low-to-high spin dynamics in aqueous iron tris-bipyridine complex, $[Fe(bpy)_3]^{2+}$, by monitoring the transient electron density distribution among excited states with a femtosecond time resolution.[2]

References:
[1] Metje, J. et al. Monochromatization of femtosecond XUV light pulses with the use of reflection zone plates. Opt. Express 22, 10747 (2014).
[2] Moguilevski, A. et al. Ultrafast Spin Crossover in [FeII(bpy)3]2+: Revealing Two Competing Mechanisms by Extreme Ultraviolet Photoemission Spectroscopy. ChemPhysChem Early view (2017). doi:10.1002/cphc.201601396