

How water changes the photophysics of small model chromophores

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The properties of atoms and molecules strongly depend on their environment, with hydrogen bonds, in particular, playing an important role in chemistry and biochemistry. It is, therefore, of great interest to bridge the gap between single molecules and molecules in solvation.

In our group, we focus on experimental studies of small, model-chromophore dynamics including one-to-one clusters of a (bio)molecule with a single water molecule attached in the gas phase [1], as well as liquid-phase studies [2]. We investigated indole and pyrrole, both relevant model systems for the photophysics of tryptophan, the most strongly near-UV absorbing amino acid. Here, we present results on the photo-induced dynamics of indole-water, pyrrole-water, and water-water dimer clusters, probed by NIR and x-ray laser sources in our lab and at large-scale facilities such as LCLS and the European XFEL. Furthermore, mid-infrared pump IR-probe experiments on indole-water mimicking thermal-energy chemistry will be presented.

Recent progress on our newly developed transportable sample injectors and endstations (COMO and eCOMO) for experiments both at large-scale facilities and in-house will also be outlined, including the use of time- and position-sensitive detection schemes provided by Timepix3 cameras [3,4].

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Keywords

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