Realtime response of photoactive (macro)molecules to pH via a novel ultrafast spectroscopy tool

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Changes of pH initiate a variety of molecular processes that are fundamental to life. It is known that, at the protein level, a sudden change of pH can drive conformational changes. In the case of proteins that bind chromophores, like photosynthetic light-harvesting complexes or microbial rhodopsins, pH-driven conformational changes then affect the energetic landscape of the pigments and, in turn, switch on and off the overall function of the complex[1–5].

However the generally (ultra)fast timescale (≤μs) associated to conformational changes is subresolution for the existing techniques, making it difficult to answer the question: how fast and via which intermediate steps do photoactive complexes respond to pH?

We will here present a novel ultrafast spectroscopy tool that finally allows to quantify: i) how fast conformational changes take place in photoactive materials following a sudden pH-jump and ii) how fast and in which terms the energetic landscape of these materials is affected when the environment changes.

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