Ziel

We propose the construction and development of a femtosecond broadband stimulated Raman setup to tackle ultra fast chemical, physical and biological processes taking advantage of the top-notch structural sensitivity inherent to the Raman process. The use of a pump-probe stimulated scheme will allow to overcome time-energy restrictions dictated by the uncertainty principle, enabling to reach the femtosecond timescale with energy resolutions which would pertain to the picosecond time domain in the Heisenberg sense. Protein dynamics span several orders of magnitude extending up to macroscopic timescales, the recipes to tailor properties of rubbers and polymers relevant for human timescales are covered by more than 500000 patents, rust reaction occurs over several days, and lethal brain strokes often lead to death within 24 hours on average. The lowest hierarchical level of such processes, however, is hidden in the very act of atomic motion and chemical binding such as the single bond dynamics in a peptide backbone, the monomer...
binding such as the single bond dynamics in a peptide backbone, the monomer cross-linking elemental reactions, the energy flow and re-distribution in a hydrogen bond network, or the oxygen binding to heme proteins, all performing on the femtosecond stage. Mastering these processes is the essence of femtochemistry, born around the backbone of the femtosecond laser technology and boosted by scientific activity which led to the Nobel prize of Prof. A. Zewail in 1999. The new capabilities offered by femtosecond sources have often left behind in the race traditional spectroscopies, which hardly follow the growing emergence of new challenging problems in which the traditional distinction between biology, chemistry and physics is smeared out by the common ultra short timescale. The set up of a non conventional femtosecond Raman technique will be the initiating event for the establishment of a research group of interdisciplinary nature toiling over unsolved problems in which the ultrafast facet plays a key role.
Begünstigte (1)

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