

Time-Resolved X-ray Scattering of Laser Excited Protein Molecules in Solution

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Thanks to unprecedented photon flux delivered by tailor made undulators and a fully synchronized laser system, ID09b has become a unique facility where structural rearrangement of transient species can be followed with 100 picoseconds time resolution. In a typical experiment, a "pump" laser pulse excites the sample and a delayed "probe" X-ray pulse captures a snapshot of the transient species. This pump-probe technique has been successfully applied to studies of reactions occurring in crystalline samples and, more recently, to reactions occurring in solution and involving photogenerated transient species of small inorganic molecules.

In this presentation I will briefly describe the application of time-resolved X-ray scattering to the study of biologically relevant protein molecules. The data show the potentiality of the technique to track protein conformational motions such as the R-T quaternary structure transition in hemoglobin (Hb), a model system that has long served as a paradigm for understanding allosteric regulation and conformational dynamics in proteins.