Chemical reactions of small molecules in solution studied by picosecond X-ray scattering

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Accurate determination of molecular structures has been one of the most challenging and enduring subject in chemistry, especially for the transient intermediates with very short lifetime. Time-resolved X-ray scattering that combines the spatial and temporal measurements can resolve the molecular geometries of short-lived transient intermediates and free radicals in a chemical reaction. In the talk, the optical pump and X-ray probe setup and ultrafast solution scattering on small molecules studied in ID09B ESRF will be introduced briefly, then the photofragmentation reaction of triruthenium dodecacarbonyl $Ru_3(CO)_{12}$ dissolved in cyclohexane will be used as an example to show the complementary nature of ultrafast X-ray scattering and ultrafast spectroscopy in the determination of transient molecular structures and chemical reaction mechanisms.