Watching Sub-nanosecond Structural Dynamics with Time-resolved X-ray Measurements at the Photon Factory Advanced Ring

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Time-resolved X-ray techniques utilizing the pulsed nature of synchrotron radiation are becoming general and powerful tools to explore structural dynamics in materials and biological sciences. This method enables to produce structural movies at 100-picosecond temporal and sub-nanometer spatial resolution. It will be fascinating to apply such capability to capture ultrafast structural dynamics in strongly-correlated electron systems, photochemical catalytic reaction dynamics in liquid or on solid surface, light-induced response of photosensitive proteins, etc.

Photon Factory Advanced Ring (PF-AR) at the High Energy Accelerator Research Organization (KEK), Tsukuba, Japan is a 6.5-GeV electron storage ring dedicated for single-bunch operation and is suitable for the sub-nanosecond time-resolved X-ray studies. We have constructed an in-vacuum undulator beamline NW14A at the PF-AR, which is designed to conduct a wide variety of time-resolved X-ray measurements, such as time-resolved diffraction, scattering and absorption. The current status of the beamline and examples of applications to materials science will be presented.