

## Relaxations of UV-excited Bio-chromophore

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### Abstract

Following ultraviolet (UV) absorption, most biomolecules quickly dissipate the photon energy into heat through internal conversion (IC) to prevent the decompositions or reaction on the electronic excited state. A criterion that minimizes the reaction on the excited state has determined the molecular architecture of life at the beginning of biogenesis.

Considerable concern has arisen on the strong effect of the repulsive  $\pi\sigma^*$  state along X–H (X: N, O, S) bonds in aromatic bio-chromophores in the past decades. IC through conical intersections (CIs), which occurs between  $\pi\pi^*$ ,  $\pi\sigma^*$ , triplet, and ground states of UV-excited bio-chromophores, serves as a particularly appealing problem for understating excited potential energy surfaces (PESs) and non-adiabatic dynamics in multi-dimensional nuclear coordinates.

At the National Synchrotron Radiation Research Center (NSRRC), we have developed a new technology of time-selected photofragment translational spectroscopy (TS-PTS) to study the dissociation dynamics of bio-chromophores in the molecular beam. This new technology enables us to clarify decades-long controversial results in the literature unambiguously. Combining with the vibrational mode-dependent time-resolved methods by picosecond lasers to study the excited state dynamics of bio-chromophore molecules, we have decoded the competing and intertwined reaction pathways that have hitherto been hindered by conventional experimental techniques.

**Keywords – Chemical Bonding, Potential Energy Surfaces, Excited-state Dynamics, Photoionization Spectroscopy.**

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